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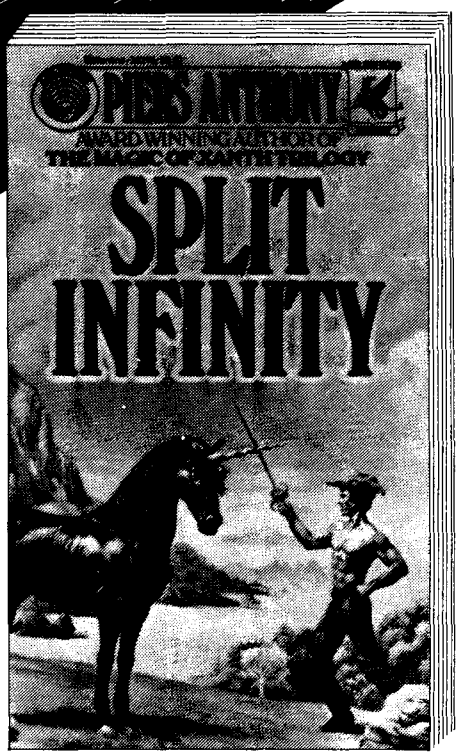

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Editorial

Non-Logical Processes In Science And Elsewhere

Stanley Schmidt

The first time I met John W. Campbell, I was immediately drawn into a philosophical free-for-all with him and his secretary. "We were just discussing the structure of the English language," John said. "There are, in English, two forms of the present tense: the 'I go' form and the 'I am going' form. In any given situation, you know exactly which one to use. But do you know what rule you are applying when you decide which one to use?"

Naturally, having been prepared by earlier stories of how John baited writers, I suspected a trap. Furthermore, I wasn't sure I knew the answer. But I did think I knew at least part of it: the distinction in usage is similar to that between the preterite and imperfect tenses in Romance languages. "Well," I said cautiously, "the 'I go' form is used for something done repeatedly or habitually but not necessarily in progress at the moment, and 'I am going' is used when I'm doing it right now."

"Aha!" he said gleefully. "I am seeing what you mean!"

Completely aside from what this incident illustrates about John, it's a beautiful example of the extent to which human beings can know quite complicated and subtle things—and prove that knowledge by using them—*without being able to put them into words*. It illustrates the existence of highly reliable forms of reasoning which operate without a conscious progression through logical steps. Indeed, the attempt to apply formal rules and logic may actually interfere with the proper operation of whatever mechanism is at work in the selection

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of grammatical forms. Many people automatically use such words as "who" and "whom" or "he" and "him" correctly (i.e., according to the book) when left to their own devices, but make mistakes when they consciously try to apply the rules to be sure they're right.

(The answer to Campbell's original question, by the way, is left as an exercise for the reader.)

Campbell touched on the existence of useful modes of thinking other than conventional logic in his 1954 editorial, "Limitation on Logic." Logic, he said (he really meant *deductive* logic), is like a chain. A logical argument consists of a series of linked steps and is only as strong as the weakest of these. One weak link destroys the whole argument, making it unable to support the conclusion. But he also recognized a "*gestalt* argument," which he compared to a *cable:* a parallel array of observations or lines of reasoning, of which no single one is strong enough to prove the conclusion and some may even be wrong—but taken together they imply a high probability that the conclusion is valid. And then there is "*analogic*," in which a structural similarity between two systems is used to draw a conclusion about one of them from a similar conclusion which is known to be true of the other. All three of these general forms of reasoning are widely used, he claimed (with good reason), but the last two tend to be viewed as inferior because their rules have not been as rigorously formulated as those of deductive logic.

My opening anecdote goes one step further: it shows that useful reasoning may be done *without conscious knowledge of which of those three forms is being used.* (Or must it be any of them? Might there be still other ways?) The reasoning is evidently being done, because a certain data input produces a well-defined output. But it is not being done in those parts of the brain, or in those ways, that we normally call "conscious." The brain is being used as a "black box," acting to produce a well-defined result, but with the inner workings hidden.

Other examples of this sort of thing abound. For several years Professor Peter Schickele has been touring the country with concerts of the outrageous music of "P. D. Q. Bach." Musicians catch more of the humor than non-musicians, but even those who don't know one note from another—much less a subdominant chord from a Phrygian mode—are nevertheless broken up by violations of the rules of harmony. Conclusion: they do know a good deal about those rules, though not on a verbal or staff-notation level.

The population runneth over with people who claim to know nothing of physics. The fact of the matter is that people who know nothing of physics do not survive past infancy. Walking across a room, for example, requires continuous, rapid, real-time analysis of a multitude of force-acceleration relationships that would be far beyond the practical capabilities of any formally analytical physicist. I never encountered a yo-yo in any of my physics courses until graduate school. What distinguishes the physicist from the ordinary person is

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that he has externalized and formalized enough of his knowledge of physics to be able to apply it to predicting the behavior of systems which do not include his own body. But only *simple* systems—the most complicated mathematical treatments done by armchair physicists and computers deal with problems inherently less complex than those solved by everyone in virtually every moment of normal waking life.

All of us recognize, without doubt or hesitation, the faces of large numbers of acquaintances—even when the actual geometry of those faces is changed quite a lot by mood or activity or age. Very few of us could put into words exactly what feature or features we use to identify a particular face. (Yes, I know about police sketch artists who draw suspects from witnesses' descriptions—but they normally work with feedback from the witnesses on what does and doesn't look right, retouching until the picture matches the memory.)

This last example leads to an interesting point. There is a tendency in some circles to belittle the less rigorous forms of reasoning in scientific situations, dismissing them as unworthy and "unscientific." Those who know a little about scientific method (what's that old saw about "a little knowledge"?) tend to equate "scientific" with "logical" and "scientific method" with "deduction." A birdwatcher who insists on being called an ornithologist may refuse to accept an identification by another who says, "It *looked* like a pileated woodpecker," but does not specifically mention its red crest—even though that's exactly how he himself identifies other people: by *gestalt*. And with very high reliability, too.

Rigorous deductive logic is indeed an important *part* of scientific method. Any aspiring scientist needs to understand that fact—but he also needs to understand that it is *only* a part. If he is to do new, important science, he must understand which parts of the scientific endeavor call for rigorous logic and which call for something else. He must have a healthy respect for the "something elses" that are sometimes needed, and not be afraid to use them when they are called for.

Science attempts to formulate, in words and equations, the laws which the universe obeys. It does not legislate; it describes. Its fundamental presupposition is that the rules are already there, independent of man; the scientist's job is to come up with statements which describe those rules as accurately as possible. In general, his statements are only approximations, and each generation of scientists tries to improve them, bringing the approximate statements into closer correspondence with actual behavior. A crucial part of this process is checking the predictions of theories against actual behavior, especially in previously unexplored regions of experience.

That's where the rigorous deduction comes in. Once a theory is formulated—always, please note, on the basis of a *finite* amount of experimental data—it can be used to deduce exactly what can be expected to happen under given conditions. For conditions in the

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range where the original data was collected, these deductions are called "engineering." They make possible the construction of buildings and bridges and vehicles and telephones—and they had better be done rigorously and *right*, or things won't work and lives will be lost. The theory will also make predictions for conditions which have not yet been tested, and it is essential to work out those deductions *and compare them with what actually happens under those conditions*. Only thus can it be determined how much better the new theory is than the old.

But *formulating* a new theory (as distinguished from a special case or extension of an old one) *cannot* be done entirely by deductive reasoning. By definition, a really new principle cannot be logically deduced from old ones. A proposition which can be so deduced is not something fundamentally new, but merely something which was already implicit in previous knowledge (or beliefs). Relativity, for example, could in no way be deduced from classical mechanics, because it requires fundamentally new concepts of space and time, or (as it historically happened) the postulate that the speed of light in vacuum is a constant for all observers. Quantum mechanics could not be deduced from classical mechanics because it required the new postulate that matter exhibits aspects of both particle and wave behavior.

In each of these cases, the new ingredient that made the breakthrough possible was something which not only could not be deduced from the premises of previous theory, but actually *contradicted* those premises—was logically

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inconsistent with them. In each such case, the breakthrough required a largely intuitive leap to a radically *new* premise, suggested by some combination of things like Campbell's inductive *gestalt* argument and analogic. Chances are the process was largely subconscious, and the man who took that leap could not know that it was right (or even a step in the right direction) until a wide range of its logical implications had been deduced and tested experimentally. But *had he refused to consider any ideas except those deduced logically from previous theories, he could not have made the breakthrough.*

Interestingly, if man had somehow stumbled onto relativity and quantum mechanics *first*, all the testable, practically useful equations of classical mechanics *could* have been deduced logically from them. But Newtonian mechanics obtained that way would not be a fundamental breakthrough (as it was when Newton did it his way), but simply a restricted special case already implicit in the more general theories. And the *reasons* assumed to underlie the equations would be quite different from those given historically.

Since "nonlogical" processes are crucial to the most important advances in understanding, it is vitally important that teachers of science stress not only logical rigor in deduction, but also an awareness of when deduction is not appropriate and something bolder is called for. They must strive to develop in their students not only high standards of intellectual honesty and meticulous attention to detail, but a realistic respect for (including an awareness of the limitations of) the *other* forms of reasoning—the *gestalt* arguments, analogics, hunches, and whatever other mysterious but useful tricks go on in dimly seen corners of our minds.

One might even hope for some serious attempt to *understand* these other modes of thinking and how they work, so that in the future they can be used more effectively and confidently. John Campbell, observing that those are used and needed by science as much as logic, expressed such a wish twenty-seven years ago. It still seems like a good idea.

For without those "nonlogical processes"—with only logical deduction from old givens—science is doomed to stagnation. ■

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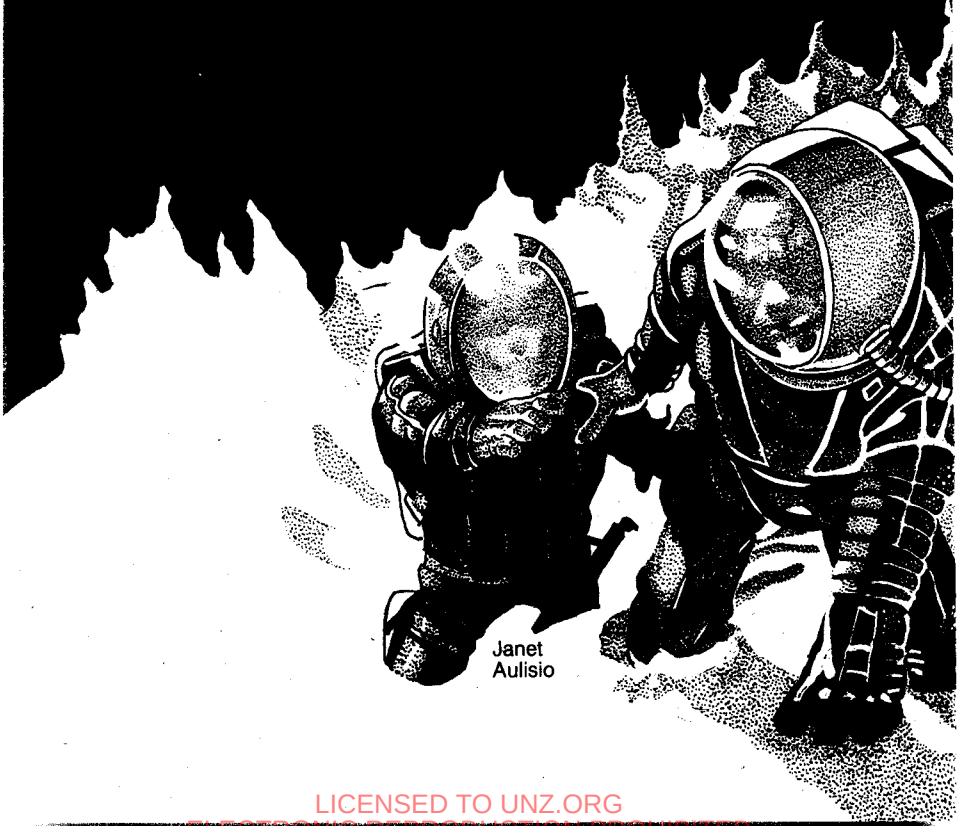
SATURN GAME

Poul Anderson

Humanity uses psychological tools as well as physical ones. In space, the most ancient of those tools will take on new uses—and new dangers



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If we are to understand what happened, which is vital if we are to avoid repeated and worse tragedies in the future, we must begin by dismissing all accusations. Nobody was negligent; no action was foolish. For who could have predicted the eventuality, or recognized its nature, until too late? Rather should we appreciate the spirit with which those people struggled against disaster, inward and outward, after they knew. The fact is that thresholds exist throughout reality, and that things on their far sides are altogether different from things on their hither sides. The *Chronos* crossed more than an abyss, it crossed a threshold of human experience.

—Francis L. Minamoto, *Death Under Saturn: A Dissenting View* (Apollo University Communications, Leyburg, Luna, 2057)

"The City of Ice is now on my horizon," *Kendrick says. Its towers gleam blue.* "My griffin spreads his wings to glide." *Wind whistles among those great, rainbow-shimmering pinions. His cloak blows back from his shoulders: the air strikes through his ring-mail and sheathes him in cold.* "I lean over and peer after you." *The spear in his left hand counterbalances him. Its head flickers palely with the moonlight that Wayland Smith hammered into the steel.*

"Yes, I see the griffin," *Ricia tells him,* "high and far, like a comet above the courtyard walls. I run out from under the portico for a better look. A guard tries to stop me, grabs my sleeve, but I tear the spider silk apart and dash forth into the open." *The elven castle wavers as if its sculptured ice were turning to smoke. Passionately, she cries,* "Is it in truth you, my darling?"

"Hold, there!" *warns Alvarlan from his cave of arcana ten thousand leagues away.* "I send your mind the message that if the King suspects this is Sir Kendrick of the Isles, he will raise a dragon against him, or spirit you off beyond any chance of rescue. Go back, Princess of Maranoa. Pretend you decide that it is only an eagle. I will cast a belief-spell on your words."

"I stay far aloft," *Kendrick says.* "Save he use a scrying stone, the Elf King will not be aware this beast has a rider. From here I'll spy out city and castle." *And then—? He knows not. He knows simply that he must set her free or die in the quest. How long will it take him, how many more nights will she lie in the King's embrace?*

"I thought you were supposed to spy out Iapetus," Mark Danzig interrupted.

His dry tone startled the three others into alertness. Jean Broberg flushed with embarrassment, Colin Scobie with irritation; Luis Garcilaso shrugged, grinned, and turned his gaze to the pilot console before which he sat harnessed. For a moment silence filled the cabin, and shadows, and radiance from the universe.

To help observation, all lights were out except a few dim glows from the instruments. The sunward ports were lidded. Elsewhere thronged stars, so many and so brilliant that they well-nigh drowned the blackness which held them. The Milky Way was a torrent of silver. One port framed Saturn at half phase, dayside pale gold and rich bands amidst the jewelry of its rings, nightside wanly ashimmer with starlight upon clouds, as big to the sight as Earth over Luna.

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Forward was Iapetus. The spacecraft rotated while orbiting the moon, to maintain a steady optical field. It had crossed the dawn line, presently at the middle of the inward-facing hemisphere. Thus it had left bare, crater-pocked land behind it in the dark, and was passing above sunlit glacier country. Whiteness dazzled, glittered in sparks and shards of color, reached fantastic shapes heavenward; cirques, crevasses, caverns brimmed with blue.

"I'm sorry," Jean Broberg whispered. "It's too beautiful, unbelievably beautiful, and . . . almost like the place where our game had brought us. Took us by surprise—"

"Huh!" Mark Danzig said. "You had a pretty good idea of what to expect, therefore you made your play go in the direction of something that resembled it. Don't tell me any different. I've watched these acts for eight years."

Colin Scobie made a savage gesture. Spin and gravity were too slight to give noticeable weight, and his movement sent him flying through the air, across the crowded cabin. He checked himself by a handhold just short of the chemist. "Are you calling Jean a liar?" he growled.

Most times he was cheerful, in a bluff fashion. Perhaps because of that, he suddenly appeared menacing. He was a big, sandy-haired man in his mid-thirties; a coverall did not disguise the muscles beneath, and the scowl on his face brought forth its ruggedness.

"Please!" Broberg exclaimed. "Not a quarrel, Colin."

The geologist glanced back at her. She was slender and fine-featured. At her age of forty-two, despite longevity treatment, the reddish-brown hair that fell to her shoulders was becoming streaked with white, and lines were engraved around large gray eyes.

"Mark is right," she sighed. "We're here to do science, not daydream." She reached forth to touch Scobie's arm, smiling shyly. "You're still full of your Kendrick persona, aren't you? Gallant, protective—" She stopped. Her voice had quickened with more than a hint of Ricia. She covered her lips and flushed again. A tear broke free and sparkled off on air currents. She forced a laugh. "But I'm just physicist Broberg, wife of astronomer Tom, mother of Johnnie and Billy."

Her glance went Saturnward, as if seeking the ship where her family waited. She might have spied it, too, as a star that moved among stars by the solar sail. However, that was now furled, and naked vision could not find even such huge hulls as *Chronos* possessed, across millions of kilometers.

Luis Garcilaso asked from his pilot's chair: "What harm if we carry on our little *commedia dell' arte?*" His Arizona drawl soothed the ear. "We won't be landin' for a while yet, and everything's on automatic till then." He was small, swarthy, and deft, still in his twenties.

Danzig twisted his leathery countenance into a frown. At sixty, thanks to his habits as well as to longevity, he kept springiness in a lank frame; he could joke about wrinkles and encroaching baldness. In this hour, he set humor aside.

"Do you mean you don't know what's the matter?" His beak of a nose pecked at a scanner screen which mag-

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nified the moonscape. "Almighty God! That's a new world we're about to touch down on—tiny, but a world, and strange in ways we can't guess. Nothing's been here before us except one unmanned flyby and one unmanned lander that soon quit sending. We can't rely on meters and cameras alone. We've got to use our eyes and brains."

He addressed Scobie. "You should realize that in your bones, Colin, if nobody else aboard does. You've worked on Luna as well as Earth. In spite of all the settlements, in spite of all the study that's been done, did you never hit any nasty surprises?"

The burly man had recovered his temper. Into his own voice came a softness that recalled the serenity of the Idaho mountains from which he hailed. "True," he admitted. "There's no such thing as having too much information when you're off Earth, or enough information, for that matter." He paused. "Nevertheless, timidity can be as dangerous as rashness—not that you're timid, Mark," he added in haste. "Why, you and Rachel could've been in a nice O'Neill on a nice pension—"

Danzig relaxed and smiled. "This was a challenge, if I may sound pompous. Just the same, we want to get home when we're finished here. We should be in time for the Bar Mitzvah of a great-grandson or two. Which requires staying alive."

"My point is," Scobie said, "if you let yourself get buffaloed, you may end up in a worse bind than— Oh, never mind. You're probably right, and we should not have begun fantasizing. The spectacle sort of grabbed us. It won't happen again."

Yet when Scobie's eyes looked anew on the glacier, they had not quite the dispassion of a scientist in them. Nor did Broberg's or Garcilaso's. Danzig slammed fist into palm. "The game, the damned childish game," he muttered, too low for his companions to hear. "Was nothing saner possible for them?"

II

Was nothing saner possible for them? Perhaps not.

If we are to answer the question, we should first review some history. When early industrial operations in space offered the hope of rescuing civilization, and Earth, from ruin, then greater knowledge of sister planets, prior to their development, became a clear necessity. The effort started with Mars, the least hostile. No natural law forbade sending small manned spacecraft yonder. What did was the absurdity of using as much fuel, time, and effort as were required, in order that three or four persons might spend a few days in a single locality.

Construction of the *J. Peter Vajk* took longer and cost more, but paid off when it, virtually a colony, spread its immense solar sail and took a thousand people to their goal in half a year and in comparative comfort. The payoff grew overwhelming when they, from orbit, launched Earthward the beneficiated minerals of Phobos that they did not need for their own purposes. Those purposes, of course, turned on the truly thorough, long-term study of Mars, and included landings of auxiliary craft, for ever-lengthier stays, all over the surface.

Sufficient to remind you of this

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much; no need to detail the triumphs of the same basic concept throughout the inner Solar System, as far as Jupiter. The tragedy of the *Vladimir* became a reason to try again for Mercury, and, in a left-handed, political way, pushed the Britannic-American consortium into its *Chronos* project.

They named the ship better than they knew. Sailing time to Saturn was eight years.

Not only the scientists must be healthy, lively-minded people. Crewfolk, technicians, medics, constables, teachers, clergy, entertainers—every element of an entire community must be. Each must command more than a single skill, for emergency backup, and keep those skills alive by regular, tedious rehearsal. The environment was limited and austere; communication with home was soon a matter of beamcasts; cosmopolitans found themselves in what amounted to an isolated village. What were they to *do?*

Assigned tasks. Civic projects, especially work on improving the interior of the vessel. Research, or writing a book, or the study of a subject, or sports, or hobby clubs, or service and handicraft enterprises, or more private interactions, or— There was a wide choice of television tapes, but Central Control made sets usable for only three hours in twenty-four. You dared not get into the habit of passivity.

Individuals grumbled, squabbled, formed and dissolved cliques, formed and dissolved marriages or less explicit relationships, begot and raised occasional children, worshipped, mocked, learned, yearned, and for the most part found reasonable satisfaction in life. But for some, including a large proportion of the gifted, what made the difference between this and misery were their psychodramas.

—Minamoto

Dawn crept past the ice, out onto the rock. It was a light both dim and harsh, yet sufficient to give Garcilaso the last data he wanted for descent.

The hiss of the motor died away. A thump shivered through the hull, landing jacks leveled it, and stillness fell. The crew did not speak for a while. They were staring out at Iapetus.

Immediately around them was desolation like that which reigns in much of the Solar System. A darkling plain curved visibly away to a horizon that, at man-height, was a bare three kilometers distant; higher up in the cabin, you could see farther, but that only sharpened the sense of being on a minute ball awhirl among the stars. The ground was thinly covered with cosmic dust and gravel; here and there a minor crater or an upthrust mass lifted out of the regolith to cast long, knife-edged, utterly black shadows. Light reflections lessened the number of visible stars, turning heaven into a bowlful of night. Halfway between the zenith and the south, half-Saturn and its rings made the vista beautiful.

Likewise did the glacier—or the glaciers? Nobody was sure. The sole knowledge was that, seen from afar, Iapetus gleamed bright at the western end of its orbit and grew dull at the eastern end, because one side was covered with whitish material while the other side was not; the dividing line passed nearly beneath the planet which

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it eternally faced. The probes from *Chronos* had reported the layer was thick, with puzzling spectra that varied from place to place, and little more about it.

In this hour, four humans gazed across pitted emptiness and saw wonder rear over the world-rim. From north to south went ramparts, battlements, spires, depths, peaks, cliffs, their shapes and shadings an infinity of fantasies. On the right Saturn cast soft amber, but that was nearly lost in the glare from the east, where a sun dwarfed almost to stellar size nonetheless blazed too fierce to look at, just above the summit. There the silvery sheen exploded in brilliance, diamond-glitter of shattered light, chill blues and greens; dazzled to tears, eyes saw the vision glimmer and waver, as if it bordered on dreamland, or on Faerie. But despite all delicate intricacies, underneath was a sense of chill and of brutal mass; here dwelt also the Frost Giants.

Broberg was the first to breathe forth a word. "The City of Ice."

"Magic," said Garcilaso as low. "My spirit could lose itself forever, wanderin' yonder. I'm not sure I'd mind. My cave is nothin' like this, nothin'—"

"Wait a minute!" snapped Danzig in alarm.

"Oh, yes. Curb the imagination, please." Though Scobie was quick to utter sobrieties, they sounded drier than needful. "We know from probe transmissions the scarp is, well, Grand Canyon-like. Sure, it's more spectacular than we realized, which I suppose makes it still more of a mystery." He turned to Broberg. "I've never seen ice or snow as sculptured as this. Have you, Jean? You've mentioned visiting a lot of mountain and winter scenery when you were a girl in Canada."

The physicist shook her head. "No. Never. It doesn't seem possible. What could have done it? There's no weather here . . . is there?"

"Perhaps the same phenomenon is responsible that laid a hemisphere bare," Danzig suggested.

"Or that covered a hemisphere," Scobie said. "An object seventeen hundred kilometers across shouldn't have gases, frozen or otherwise. Unless it's a ball of such stuff clear through, like a comet, which we know it's not." As if to demonstrate, he unclipped a pair of pliers from a nearby tool rack, tossed it, and caught it on its slow way down. His own ninety kilos of mass weighed about seven. For that, the satellite must be essentially rocky.

Garcilaso registered impatience. "Let's stop tradin' facts and theories we already know about, and start findin' answers."

Rapture welled in Broberg. "Yes, let's get out. Over *there*."

"Hold on," protested Danzig as Garcilaso and Scobie nodded eagerly. "You can't be serious. Caution, step-by-step advance—"

"No, it's too wonderful for that." Broberg's tone shivered.

"Yeah, to hell with fiddlin' around," Garcilaso said. "We need at least a preliminary scout right away."

The furrows deepened in Danzig's visage. "You mean you too, Luis? But you're our pilot!"

"On the ground I'm general assistant, chief cook, and bottle washer to

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you scientists. Do you think I want to sit idle, with somethin' like that to explore?" Garcilaso calmed his voice. "Besides, if I should come to grief, any of you can fly back, given a bit of radio talk from *Chronos* and a final approach under remote control."

"It's quite reasonable, Mark," Scobie argued. "Contrary to doctrine, true; but doctrine was made for us, not vice versa. A short distance, low gravity, and we'll be on the lookout for hazards. The point is, until we have some notion of what that ice is like, we don't know what the devil to pay attention to in this vicinity, either. No, first we'll take a quick jaunt. When we return, then we'll plan."

Danzig stiffened. "May I remind you, if anything goes wrong, help is at least a hundred hours away? An auxiliary like this can't boost any higher if it's to get back, and it'd take longer than that to disengage the big boats from Saturn and Titan."

Scobie reddened at the implied insult. "And may I remind you: on the ground I am the captain. I say an immediate reconnaissance is safe and desirable. Stay behind if you want— In fact, yes, you must. Doctrine is right in saying the vessel mustn't be deserted."

Danzig studied him for several seconds before murmuring, "Luis goes, though, is that it?"

"Yes!" cried Garcilaso so that the cabin rang.

Broberg patted Danzig's limp hand. "It's okay, Mark," she said gently. "We'll bring back samples for you to study. After that, I wouldn't be surprised but what the best ideas about procedure will be yours."

He shook his head. Suddenly he looked very tired. "'No," he replied in a monotone, "that won't happen. You see, I'm only a hardnosed industrial chemist who saw this expedition as a chance to do interesting research. The whole way through space, I kept myself busy with ordinary affairs, including, you remember, a couple of inventions I'd wanted the leisure to develop. You three, you're younger, you're romantics—"

"Aw, come off it, Mark." Scobie tried to laugh. "Maybe Jean and Luis are, a little, but me, I'm about as otherworldly as a plate of haggis."

"You played the game, year after year, until at last the game started playing you. That's what's going on this minute, no matter how you rationalize your motives." Danzig's gaze on the geologist, who was his friend, lost the defiance that had been in it and turned wistful. "You might try recalling Delia Ames."

Scobie bristled. "What about her? The business was hers and mine, nobody else's."

"Except afterward she cried on Rachel's shoulder, and Rachel doesn't keep secrets from me. Don't worry, I'm not about to blab. Anyhow, Delia got over it. But if you'd recollect objectively, you'd see what had happened to you, already three years ago."

Scobie set his jaw. Danzig smiled in the left corner of his mouth. "No, I suppose you can't," he went on. "I admit I had no idea either, till now, how far the process had gone. At least keep your fantasies in the background while you're outside, will you? Can you?"

* * *

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In half a decade of travel, Scobie's apartment had become idiosyncratically his—perhaps more so than was usual, since he remained a bachelor who seldom had women visitors for longer than a few nightwatches at a time. Much of the furniture he had made himself; the agrosections of *Chronos* produced wood, hide, and fiber as well as food and fresh air. His handiwork ran to massiveness and archaic carved decorations. Most of what he wanted to read he screened from the data banks, of course, but a shelf held a few old books—Childe's border ballads, an eighteenth-century family Bible (despite his agnosticism), a copy of *The Machinery of Freedom* which had nearly disintegrated but displayed the signature of the author, and other valued miscellany. Above them stood a model of a sailboat in which he had cruised Northern European waters, and a trophy he had won in handball aboard this ship. On the bulkheads hung his fencing sabers and numerous pictures—of parents and siblings, of wilderness areas he had tramped on Earth, of castles and mountains and heaths in Scotland where he had often been too, of his geological team on Luna, of Thomas Jefferson and, imagined, Robert the Bruce.

On a certain evenwatch he had, though, been seated before his telescreen. Lights were turned low in order that he might fully savor the image. Auxiliary craft were out in a joint exercise, and a couple of their personnel used the opportunity to beam back views of what they saw.

That was splendor. Starful space made a chalice for *Chronos*. The two huge, majestically counter-rotating cylinders, the entire complex of linkages, ports, locks, shields, collectors, transmitters, docks, all became Japanesely exquisite at a distance of several hundred kilometers. It was the solar sail which filled most of the screen, like a turning golden sun-wheel; yet remote vision could also appreciate its spiderweb intricacy, soaring and subtle curvatures, even the less-than-gossamer thinness. A mightier work than the Pyramids, a finer work than a refashioned chromosome, the ship moved on toward a Saturn which had become the second brightest beacon in the firmament.

The doorchime hauled Scobie out of his exaltation. As he started across the deck, he stubbed his toe on a table leg. Coriolis force caused that. It was slight, when a hull this size spun to give a full gee of weight, and a thing to which he had long since adapted; but now and then he got so interested in something that Terrestrial habits returned. He swore at his absent-mindedness, good-naturedly, since he anticipated a pleasurable time.

When he opened the door, Delia Ames entered in a single stride. At once she closed it behind her and stood braced against it. She was a tall blonde woman who did electronics maintenance and kept up a number of outside activities. "Hey!" Scobie said. "What's wrong? You look like—" he tried for levity "—something my cat would've dragged in, if we had any mice or beached fish aboard."

She drew a ragged breath. Her Australian accent thickened till he had trouble understanding: "I . . . today . . . I happened to be at the same cafeteria table as George Harding—"

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Unease tingled through Scobie. Harding worked in Ames's department but had much more in common with him. In the game group to which they both belonged, Harding likewise took a vaguely ancestral role, N'Kuma the Lionslayer.

"What happened?" Scobie asked.

Woe stared back at him. "He mentioned . . . you and he and the rest . . . you'd be taking your next holiday together . . . to carry on your, your bloody act uninterrupted."

"Well, yes. Work at the new park over in Starboard Hull will be suspended till enough metal's been recycled for the water pipes. The area will be vacant, and my gang has arranged to spend a week's worth of days—"

"But you and I were going to Lake Armstrong!"

"Uh, wait, that was just a notion we talked about, no definite plan yet, and this is such an unusual chance— Later, sweetheart. I'm sorry." He took her hands. They felt cold. He essayed a smile. "Now, c'mon, we were going to cook a festive dinner together and afterward spend a, shall we say, quiet evening at home. But for a start, this absolutely gorgeous presentation on the screen—"

She jerked free of him. The gesture seemed to calm her. "No, thanks," she said, flat-voiced. "Not when you'd rather be with that Broberg woman. I only came by to tell you in person I'm getting out of the way of you two."

"*Huh?*" He stepped back. "What the flaming hell do you mean?"

"You know jolly well."

"I don't! She, I, she's happily married, got two kids, she's older than me, we're friends, sure, but there's never been a thing between us that wasn't in the open and on the level—" Scobie swallowed. "You suppose maybe I'm in love with her?"

Ames looked away. Her fingers writhed together. "I'm not about to go on being a mere convenience to you, Colin. You have plenty of those. Myself, I'd hoped— But I was wrong, and I'm going to cut my losses before they get worse."

"But . . . Dee, I swear I haven't fallen for anybody else, and I . . . I swear you're more than a body to me, you're a fine person—" She stood mute and withdrawn. Scobie gnawed his lip before he could tell her: "Okay, I admit it, the main reason I volunteered for this trip was I'd lost out in a love affair on Earth. Not that the project doesn't interest me, but I've come to realize what a big chunk out of my life it is. You, more than any other woman, Dee, you've gotten me to feel better about the situation."

She grimaced. "But not as much as your psychodrama has, right?"

"Hey, you must think I'm obsessed with the game. I'm not. It's fun and—oh, maybe 'fun' is too weak a word—but anyhow, it's just little bunches of people getting together fairly regularly to play. Like my fencing, or a chess club, or, or anything."

She squared her shoulders. "Well, then," she asked, "will you cancel the date you've made and spend your holiday with me?"

"I, uh, I can't do that. Not at this stage. Kendrick isn't off on the periphery of current events, he's closely involved with everybody else. If I didn't

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show, it'd spoil things for the rest."

Her glance steadied upon him. "Very well. A promise is a promise, or so I imagined. But afterward— Don't be afraid. I'm not trying to trap you. That would be no good, would it? However, if I maintain this liaison of ours, will you phase yourself out of your game?"

"I can't—" Anger seized him. "No, God damn it!" he roared.

"Then goodbye, Colin," she said, and departed. He stared for minutes at the door she had shut behind her.

Unlike the large Titan and Saturn-vicinity explorers, landers on the airless moons were simply modified Luna-to-space shuttles, reliable, but with limited capabilities. When the blocky shape had dropped below the horizon, Garcilaso said into his radio: "We've lost sight of the boat, Mark. I must say it improves the view." One of the relay microsatellites which had been sown in orbit passed his words on.

"Better start blazing your trail, then," Danzig reminded.

"My, my, you *are* a fussbudget, aren't you?" Nevertheless Garcilaso unholstered the squirt gun at his hip and splashed a vividly fluorescent circle of paint on the ground. He would do it at eyeball intervals until his party reached the glacier. Except where dust lay thick over the regolith, footprints were faint under the feeble gravity, and absent when a walker crossed continuous rock.

Walker? No, leaper. The three bounded exultant, little hindered by spacesuits, life support units, tool and ration packs. The naked land fled from their haste, and ever higher, ever clearer and more glorious to see, loomed the ice ahead of them.

There was no describing it, not really. You could speak of lower slopes and palisades above, to a mean height of perhaps a hundred meters, with spires towering farther still. You could speak of gracefully curved tiers going up those braes, of lacy parapets and fluted crags and arched openings to caves filled with wonders, of mysterious blues in the depths and greens where light streamed through translucencies, of gem-sparkle across whiteness where radiance and shadow wove mandalas—and none of it would convey anything more than Scobie's earlier, altogether inadequate comparison to the Grand Canyon.

"Stop," he said for the dozenth time. "I want to take a few pictures."

"Will anybody understand them who hasn't been here?" whispered Broberg.

"Probably not," said Garcilaso in the same hushed tone. "Maybe no one but us ever will."

"What do you mean by that?" demanded Danzig's voice.

"Never mind," snapped Scobie.

"I think I know," the chemist said. "Yes, it is a great piece of scenery, but you're letting it hypnotize you."

"If you don't cut out that drivel," Scobie warned, "we'll cut you out of the circuit. Damn it, we've got work to do. Get off our backs."

Danzig gusted a sigh. "Sorry. Uh, are you finding any clues to the nature of that—that thing?"

Scobie focused his camera. "Well," he said, partly mollified, "the different shades and textures, and no doubt the different shapes, seem to confirm what the reflection spectra from the flyby suggested. The composition is a mix-

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ture, or a jumble, or both, of several materials, and varies from place to place. Water ice is obvious, but I feel sure of carbon dioxide too, and I'd bet on ammonia, methane, and presumably lesser amounts of other stuff."

"Methane? Could that stay solid at ambient temperatures, in a vacuum?"

"We'll have to find out for sure. However, I'd guess that most of the time it's cold enough, at least for methane strata that occur down inside where there's pressure on them."

Within the vitryl globe of her helmet, Broberg's features showed delight. "Wait!" she cried. "I have an idea—about what happened to the probe that landed." She drew a breath. "It came down almost at the foot of the glacier, you recall. Our view of the site from space seemed to indicate that an avalanche buried it, but we couldn't understand how that might have been triggered. Well, suppose a methane layer at exactly the wrong location melted. Heat radiation from the jets may have warmed it, and later the radar beam used to map contours added the last few degrees necessary. The stratum flowed, and down came everything that had rested on top of it."

"Plausible," Scobie said. "Congratulations, Jean."

"Nobody thought of the possibility in advance?" Garcilaso scoffed. "What kind of scientists have we got along?"

"The kind who were being overwhelmed by work after we reached Saturn, and still more by data input," Scobie answered. "The universe is bigger than you or anybody can realize, hotshot."

"Oh. Sure. No offense." Garcilaso's glance returned to the ice. "Yes, we'll never run out of mysteries, will we?"

"Never." Broberg's eyes glowed enormous. "At the heart of things will always be magic. The Elf King rules—"

Scobie returned his camera to its pouch. "Stow the gab and move on," he ordered curtly.

His gaze locked for an instant with Broberg's. In the weird, mingled light, it could be seen that she went pale, then red, before she sprang off beside him.

Ricia had gone alone into Moonwood on Midsummer Eve. The King found her there and took her unto him as she had hoped. Ecstasy became terror when he afterward bore her off; yet her captivity in the City of Ice brought her many more such hours, and beauties and marvels unknown among mortals. Alvarlan, her mentor, sent his spirit in quest of her, and was himself beguiled by what he found. It was an effort of will for him to tell Sir Kendrick of the Isles where she was, albeit he pledged his help in freeing her.

N'Kuma the Lionslayer, Béla of Eastmarch, Karina Far West, Lady Aurelia, Olav Harpmaster had none of them been present when this happened.

The glacier (a wrong name for something that might have no counterpart in the Solar System) lifted off the plain abruptly as a wall. Standing there, the three could no longer see the heights. They could, though, see that the slope which curved steeply upward to a filigree-topped edge was not smooth. Shadows lay blue in countless small craters. The sun had climbed just sufficiently high to beget them; a Iapetan day is more than seventy-nine of Earth's.

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Danzig's question crackled in their earphones: "Now are you satisfied? Will you come back before a fresh landslide catches you?"

"It won't," Scobie replied. "We aren't a vehicle, and the local configuration has clearly been stable for centuries or better. Besides, what's the point of a manned expedition if nobody investigates anything?"

"I'll see if I can climb," Garcilaso offered.

"No, wait," Scobie commanded. "I've had experience with mountains and snowpacks, for whatever that may be worth. Let me work out a route for us first."

"You're going onto that stuff, the whole gaggle of you?" exploded Danzig. "Have you completely lost your minds?"

Scobie's brow and lips tightened. "Mark, I warn you again, if you don't get your emotions under control we'll cut you off. We'll hike on a ways if I decide it's safe."

He paced back and forth, in floating low-weight fashion, while he surveyed the jökull. Layers and blocks of distinct substances were plain to see, like separate ashlars laid by an elvish mason—where they were not so huge that a giant must have been at work. The craterlets might be sentry posts on this lowest embankment of the City's defenses . . . .

Garcilaso, most vivacious of men, stood motionless and let his vision lose itself in the sight. Broberg knelt down to examine the ground, but her own gaze kept wandering aloft.

Finally she beckoned. "Colin, come over here, please," she said. "I believe I've made a discovery."

Scobie joined her. As she rose, she scooped a handful of fine black particles off the shards on which she stood and let it trickle from her glove. "I suspect this is the reason the boundary of the ice is sharp," she told him.

"What is?" Danzig inquired from afar. He got no answer.

"I noticed more and more dust as we went along," Broberg continued. "If it fell on patches and lumps of frozen stuff, isolated from the main mass, and covered them, it would absorb solar heat till they melted or, likelier, sublimed. Even water molecules would escape to space, in this weak gravity. The main mass was too big for that; square-cube law. Dust grains there would simply melt their way down a short distance, then be covered as surrounding material collapsed on them, and the process would stop."

"H'm." Scobie raised a hand to stroke his chin, encountered his helmet, and sketched a grin at himself. "Sounds reasonable. But where did so much dust come from—and the ice, for that matter?"

"I think—" Her voice dropped until he could barely hear, and her look went the way of Garcilaso's. His remained upon her face, profiled against stars. "I think this bears out your comet hypothesis, Colin. A comet struck Iapetus. It came from the direction it did because it got so near Saturn that it was forced to swing in a hairpin bend around the planet. It was enormous; the ice of it covered almost a hemisphere, in spite of much more being vaporized and lost. The dust is partly from it, partly generated by the impact."

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He clasped her armored shoulder. "*Your* theory, Jean. I was not the first to propose a comet, but you're the first to corroborate with details."

She didn't appear to notice, except that she murmured further: "Dust can account for the erosion that made those lovely formations, too. It caused differential melting and sublimation on the surface, according to the patterns it happened to fall in and the mixes of ices it clung to, until it was washed away or encysted. The craters, these small ones and the major ones we've observed from above, they have a separate but similar origin. Meteorites—"

"Whoa, there," he objected. "Any sizable meteorite would release enough energy to steam off most of the entire field."

"I know. Which shows the comet collision was recent, less than a thousand years ago, or we wouldn't be seeing this miracle today. Nothing big has since happened to strike, yet. I'm thinking of little stones, cosmic sand, in prograde orbits around Saturn so that they hit with low relative speed. Most simply make dimples in the ice. Lying there, however, they collect solar heat because they're dark, and re-radiate it to melt away their surroundings, till they sink beneath. The concavities they leave reflect incident radiation from side to side, and thus continue to grow. The pothole effect. And again, because the different ices have different properties, you don't get perfectly smooth craters, but those fantastic bowls we saw before we landed."

"By God!" Scobie hugged her. "You're a genius."

Helmet against helmet, she smiled and said, "No. It's obvious, once you've seen for yourself." She was quiet for a bit while still they held each other. "Scientific intuition is a funny thing, I admit," she went on at last. "Considering the problem, I was hardly aware of my logical mind. What I thought was—the City of Ice, made with starstones out of that which a god called down from heaven—"

"Jesus Maria!" Garcilaso spun about to stare at them.

Scobie released the woman. "We'll go after confirmation," he said unsteadily. "To the large crater we spotted a few klicks inward. The surface appears quite safe to walk on."

"I called that crater the Elf King's Dance Hall," Broberg mused, as if a dream were coming back to her.

"Have a care." Garcilaso's laugh rattled. "Heap big medicine yonder. The King is only an inheritor; it was giants who built these walls, for the gods."

"Well, I've got to find a way in, don't I?" Scobie responded.

"Indeed," *Alvarlan says*. "I cannot guide you from this point. My spirit can only see through mortal eyes. I can but lend you my counsel, until we have neared the gates."

"Are you sleepwalking in that fairy tale of yours?" Danzig yelled. "Come back before you get yourselves killed!"

"Will you dry up?" Scobie snarled. "It's nothing but a style of talk we've got between us. If you can't understand that, you've got less use of your brain than we do."

"Listen, won't you? I didn't say you're crazy. You don't have delusions or anything like that. I do say you've

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steered your fantasies toward this kind of place, and now the reality has reinforced them till you're under a compulsion you don't recognize. Would you go ahead so recklessly anywhere else in the universe? Think!''

''That does it. We'll resume contact after you've had time to improve your manners.'' Scobie snapped off his main radio switch. The circuits that stayed active served for close-by communication but had no power to reach an orbital relay. His companions did likewise.

The three faced the awesomeness before them. ''You can help me find the Princess when we are inside, Alvarlan,'' *Kendrick says.*

''That I can and will,'' *the sorcerer vows.*

''I wait for you, most steadfast of my lovers,'' *Ricia croons.*

Alone in the spacecraft, Danzig wellnigh sobbed, ''Oh, damn that game forever!'' The sound fell away into emptiness.

III

To condemn psychodrama, even in its enhanced form, would be to condemn human nature.

It begins in childhood. Play is necessary to an immature mammal, a means of learning to handle the body, the perceptions, and the outside world. The young human plays, must play, with its brain too. The more intelligent the child, the more its imagination needs exercise. There are degrees of activity, from the passive watching of a show on a screen, onward through reading, daydreaming, storytelling, and psychodrama . . . for which the child has no such fancy name.

We cannot give this behavior any single description, for the shape and course it takes depends on an endless number of variables. Sex, age, culture, and companions are only the most obvious. For example, in pre-electronic North America little girls would often play ''house'' while little boys played ''cowboys and Indians'' or ''cops and robbers,'' whereas nowadays a mixed group of their descendants might play ''dolphins'' or ''astronauts and aliens.'' In essence, a small band forms, and each individual makes up a character to portray or borrows one from fiction. Simple props may be employed, such as toy weapons, or a chance object—a stick, for instance—may be declared something else such as a metal detector, or a thing may be quite imaginary, as the scenery almost always is. The children then act out a drama which they compose as they go along. When they cannot physically perform a certain action, they describe it. (''I jump real high, like you can do on Mars, an' come out over the edge o' that ol' Valles Marineris, an' take that bandit by surprise.'') A large cast of characters, especially villains, frequently comes into existence by fiat.

The most imaginative member of the troupe dominates the game and the evolution of the story line, though in a rather subtle fashion, through offering the most vivid possiblities. The rest, however, are brighter than average: psychodrama in this highly developed form does not appeal to everybody.

For those to whom it does, the effects are beneficial and lifelong. Besides increasing their creativity through use, it lets them try out a play version of dif-

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ferent adult roles and experiences. Thereby they begin to acquire insight into adulthood.

Such play-acting ends when adolescence commences, if not earlier—but only in that form, and not necessarily forever in it. Grown-ups have many dream-games. This is plain to see in lodges, for example, with their titles, costumes, and ceremonies; but does it not likewise animate all pageantry, every ritual? To what extent are our heroisms, sacrifices, and self-aggrandizements the acting out of personae that we maintain? Some thinkers have attempted to trace this element through every aspect of society.

Here, though, we are concerned with overt psychodrama among adults. In Western civilization it first appeared on a noticeable scale during the middle twentieth century. Psychiatrists found it a powerful diagnostic and therapeutic technique. Among ordinary folk, war and fantasy games, many of which involved identification with imaginary or historical characters, became increasingly popular. In part this was doubtless a retreat from the restrictions and menaces of that unhappy period, but likely in larger part it was a revolt of the mind against the inactive entertainment, notably television, which had come to dominate recreation.

The Chaos ended those activities. Everybody knows about their revival in recent times—for healthier reasons, one hopes. By projecting three-dimensional scenes and appropriate sounds from a data bank—or, better yet, by having a computer produce them to order—players gained a sense of reality that intensified their mental and emotional commitment. Yet in those games that went on for episode after episode, year after real-time year, whenever two or more members of a group could get together to play, they found themselves less and less dependent on such appurtenances. It seemed that, through practice, they had regained the vivid imaginations of their childhoods, and could make anything, or airy nothing itself, into the objects and the worlds they desired.

I have deemed it necessary thus to repeat the obvious in order that we may see it in perspective. The news beamed from Saturn has brought widespread revulsion. (Why? What buried fears have been touched? This is subject matter for potentially important research.) Overnight, adult psychodrama has become unpopular; it may become extinct. That would, in many ways, be a worse tragedy than what has occurred yonder. There is no reason to suppose that the game ever harmed any mentally sound person on Earth; on the contrary. Beyond doubt, it has helped astronauts stay sane and alert on long, difficult missions. If it has no more medical use, that is because psychotherapy has become a branch of applied biochemistry.

And this last fact, the modern world's dearth of experience with madness, is at the root of what happened. Although he could not have foreseen the exact outcome, a twentieth-century psychiatrist might have warned against spending eight years, an unprecedented stretch of time, in as strange an environment as the *Chronos*. Strange it certainly has been, despite all efforts—limited, totally man-controlled, devoid of countless cues for which our evolution on Earth has fashioned us. Extraterrestrial

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colonists have, thus far, had available to them any number of simulations and compensations, of which close, full contact with home and frequent opportunities to visit there are probably the most significant. Sailing time to Jupiter was long, but half of that to Saturn. Moreover, because they were earlier, scientists in the *Zeus* had much research to occupy them en route, which it would be pointless for later travelers to duplicate; by then, the interplanetary medium between the two giants held few surprises.

Contemporary psychologists were aware of this. They understood that the persons most adversely affected would be the most intelligent, imaginative, and dynamic—those who were supposed to make the very discoveries at Saturn which were the purpose of the undertaking. Being less familiar than their predecessors with the labyrinth that lies, Minotaur-haunted, beneath every human consciousness, the psychologists expected purely benign consequences of whatever psychodramas the crew engendered.

—Minamoto

Assignments to teams had not been made in advance of departure. It was sensible to let professional capabilities reveal themselves and grow on the voyage, while personal relationships did the same. Eventually such factors would help in deciding what individuals should train for what tasks. Long-term participation in a group of players normally forged bonds of friendship that were desirable, if the members were otherwise qualified.

In real life, Scobie always observed strict propriety toward Broberg. She was attractive, but she was monogamous, and he had no wish to alienate her. Besides, he liked her husband. (Tom did not partake of the game. As an astronomer, he had plenty to keep his attention happily engaged.) They had played for a couple of years, and their group had acquired as many characters as it could accommodate in a narrative whose milieu and people were becoming complex, before Scobie and Broberg spoke of anything intimate.

By then, the story they enacted was doing so, and maybe it was not altogether by chance that they met when both had several idle hours. This was in the weightless recreation area at the spin axis. They tumbled through aerobatics, shouting and laughing, until they were pleasantly tired, went to the clubhouse, turned in their wingsuits, and showered. They had not seen each other nude before; neither commented, but he did not hide his enjoyment of the sight, while she colored and averted her glance as tactfully as she was able. Afterward, their clothes resumed, they decided on a drink before they went home, and sought the lounge.

Since evenwatch was approaching nightwatch, they had the place to themselves. At the bar, he thumbed a chit for Scotch, she for Pinot Chardonnay. The machine obliged them and they carried their refreshments out onto the balcony. Seated at a table, they looked across immensity. The clubhouse was built into the support frame on a Lunar gravity level. Above them they saw the sky wherein they had been as birds; its reach did not seem any more hemmed in by far-spaced, spidery girders than

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it was by a few drifting clouds. Beyond, and straight ahead, decks opposite were a commingling of masses and shapes which the scant illumination at this hour turned into mystery. Among those shadows the humans made out woods, brooks, pools, turned hoary or agleam by the light of stars which filled the skyview strips. Right and left, the hull stretched off beyond sight, a dark in which such lamps as there were appeared lost.

The air was cool, slightly jasmine-scented, drenched with silence. Underneath and throughout, subliminally, throbbed the myriad pulses of the ship.

"Magnificent," Broberg said low, gazing outward. "What a surprise."

"Eh?" asked Scobie.

"I've only been here before in daywatch. I didn't anticipate a simple rotation of the reflectors would make it wonderful."

"Oh, I wouldn't sneer at the daytime view. Mighty impressive."

"Yes, but—but then you see too plainly that everything is manmade, nothing is wild or unknown or free. The sun blots out the stars; it's as though no universe existed beyond this shell we're in. Tonight is like being in Maranoa," *the kingdom of which Ricia is Princess, a kingdom of ancient things and ways, wildernesses, enchantments.*

"H'm, yeah, sometimes I feel trapped myself," Scobie admitted. "I thought I had a journey's worth of geological data to study, but my project isn't going anywhere very interesting."

"Same for me." Broberg straightened where she sat, turned to him, and smiled a trifle. The dusk softened her features, made them look young. "Not that we're entitled to self-pity. Here we are, safe and comfortable till we reach Saturn. After that we should never lack for excitement, or for material to work with on the way home."

"True." Scobie raised his glass. "Well, skoal. Hope I'm not mispronouncing that."

"How should I know?" she laughed. "My maiden name was Almyer."

"That's right, you've adopted Tom's surname. I wasn't thinking. Though that is rather unusual these days, hey?"

She spread her hands. "My family was well-to-do, but they were —are—Jerusalem Catholics. Strict about certain things; archaistic, you might say." She lifted her wine and sipped. "Oh, yes, I've left the Church, but in several ways the Church will never leave me."

"I see. Not to pry, but, uh, this does account for some traits of yours I couldn't help wondering about."

She regarded him over the rim of her glass. "Like what?"

"Well, you've got a lot of life in you, vigor, a sense of fun, but you're also—what's the word?—uncommonly domestic. You've told me you were a quiet faculty member of Yukon University till you married Tom." Scobie grinned. "Since you two kindly invited me to your last anniversary party, and I know your present age, I deduced that you were thirty then." Unmentioned was the likelihood that she had still been a virgin. "Nevertheless—oh, forget it. I said I don't want to pry."

"Go ahead, Colin," she urged. "That line from Burns sticks in my mind, since you introduced me to his poetry. 'To see oursels as others see us!' Since it

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looks as if we may visit the same moon—''

Scobie took a hefty dollop of Scotch. ''Aw, nothing much,'' he said, unwontedly diffident. ''If you must know, well, I have the impression that being in love wasn't the single good reason you had for marrying Tom. He'd already been accepted for this expedition, and given your personal qualifications, that would get you in too. In short, you'd grown tired of routine respectability and here was how you could kick over the traces. Am I right?''

''Yes.'' Her gaze dwelt on him. ''You're more perceptive than I supposed.''

''No, not really. A roughneck rockhound. But Ricia's made it plain to see that you're more than a demure wife, mother, and scientist—'' She parted her lips. He raised a palm. ''No, please, let me finish. I know it's bad manners to claim somebody's persona is a wish fulfillment, and I'm not doing that. Of course you don't want to be a free-roving, free-loving female scamp, any more than I want to ride around cutting down assorted enemies. Still, if you'd been born and raised in the world of our game, I feel sure you'd be a lot like Ricia. And that potential is part of you, Jean.'' He tossed off his drink. ''If I've said too much, please excuse me. Want a refill?''

''I'd better not, but don't let me stop you.''

''You won't.'' He rose and bounded off.

When he returned, he saw that she had been observing him through the vitryl door. As he sat down, she smiled, leaned a bit across the table, and told him softly: ''I'm glad you said what you did. Now I can declare what a complicated man Kendrick reveals you to be.''

''What?'' Scobie asked in honest surprise. ''Come on! He's a sword-and-shield tramp, a fellow who likes to travel, same as me; and in my teens I was a brawler, same as him.''

''He may lack polish, but he's a chivalrous knight, a compassionate overlord, a knower of sagas and traditions, an appreciator of poetry and music, a bit of a bard . . . Ricia misses him. When will he get back from his latest quest?''

''I'm bound home this minute. N'Kuma and I gave those pirates the slip and landed at Haverness two days ago. After we buried the swag, he wanted to visit Béla and Karina and join them in whatever they've been up to, so we bade goodbye for the time being.'' Scobie and Harding had lately taken a few hours to conclude that adventure of theirs. The rest of the group had been mundanely occupied for some while.

Broberg's eyes widened. ''From Haverness to the Isles? But I'm in Castle Devaranda, right in between.''

''I hoped you'd be.''

''I can't wait to hear your story.''

''I'm pushing on after dark. The moon is bright and I've got a pair of remounts I bought with a few gold pieces from the loot.'' *The dust rolls white beneath drumming hoofs. Where a horseshoe strikes a flint pebble, sparks fly ardent. Kendrick scowls.* ''You, aren't you with . . . what's his name? . . . Joran the Red? I don't like him.''

''I sent him packing a month ago. He got the idea that sharing my bed gave

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him authority over me. It was never anything but a romp. I stand alone on the Gerfalcon Tower, looking south over moonlit fields, and wonder how you fare. The road flows toward me like a gray river. Do I see a rider come at a gallop, far and far away?"

After many months of play, no image on a screen was necessary. *Pennons on the night wind stream athwart the stars.* "I arrive. I sound my horn to rouse the gatekeepers."

"How I do remember those merry notes—"

That same night, Kendrick and Ricia become lovers. Experienced in the game and careful of its etiquette, Scobie and Broberg uttered no details about the union; they did not touch each other and maintained only fleeting eye contact; the ultimate goodnights were very decorous. After all, this was a story they composed about two fictitious characters in a world that never was.

The lower slopes of the jökull rose in tiers which were themselves deeply concave; the humans walked around their rims and admired the extravagant formations beneath. Names sprang onto lips: the Frost Garden, the Ghost Bridge, the Snow Queen's Throne, *while Kendrick advances into the City, and Ricia awaits him at the Dance Hall, and the spirit of Alvarlan carries word between them so that it is as if already she too travels beside her knight.* Nevertheless they proceeded warily, vigilant for signs of danger, especially whenever a change of texture or hue or anything else in the surface underfoot betokened a change in its nature.

Above the highest ledge reared a cliff too sheer to scale, Iapetan gravity or no, *the fortress wall.* However, from orbit the crew had spied a gouge in the vicinity, forming a pass, doubtless plowed by a small meteorite *in the war between the gods and the magicians, when stones chanted down from the sky wrought havoc so accursed that none dared afterward rebuild.* That was an eerie climb, hemmed in by heights which glimmered in the blue twilight they cast, heaven narrowed to a belt between them where stars seemed to blaze doubly brilliant.

"There must be guards at the opening," *Kendrick says.*

"A single guard," *answers the mind-whisper of Alvarlan,* "but he is a dragon. If you did battle with him, the noise and flame would bring every warrior here upon you. Fear not. I'll slip into his burnin' brain and weave him such a dream that he'll never see you."

"The King might sense the spell," *says Ricia through him.* "Since you'll be parted from us anyway while you ride the soul of that beast, Alvarlan, I'll seek him out and distract him."

Kendrick grimaces, knowing full well what means are hers to do that. She has told him how she longs for freedom and her knight; she has also hinted that elven lovemaking transcends the human. Does she wish for a final time before her rescue? . . . Well, Ricia and Kendrick have neither plighted nor practiced single troth. Assuredly Colin Scobie had not. He jerked forth a grin and continued through the silence that had fallen on all three.

They came out on top of the glacial mass and looked around them. Scobie whistled. Garcilaso stammered, "J-J-

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Jesus Christ!'' Broberg smote her hands together.

Below them the precipice fell to the ledges, whose sculpturing took on a wholly new, eldritch aspect, gleam and shadow, until it ended at the plain. Seen from here aloft, the curvature of the moon made toes strain downward in boots, as if to cling fast and not be spun off among the stars which surrounded, rather than shone above, its ball. The spacecraft stood minute on dark, pocked stone, like a cenotaph raised to loneliness.

Eastward the ice reached beyond an edge of sight which was much closer. (''Yonder could be the rim of the world,'' Garcilaso said, and *Ricia replies,* ''Yes, the City is nigh to there.'') Bowls of different sizes, hillocks, crags, no two of them eroded the same way, turned its otherwise level stretch into a surreal maze. An arabesque openwork ridge which stood at the explorers' goal overtopped the horizon. Everything that was illuminated lay gently aglow. Radiant though the sun was, it cast the light of only, perhaps, five thousand full Lunas upon Earth. Southward, Saturn's great semidisc gave about one-half more Lunar shining; but in that direction, the wilderness sheened pale amber.

Scobie shook himself. ''Well, shall we go?'' His prosaic question jarred the others; Garcilaso frowned and Broberg winced.

She recovered. ''Yes, hasten,'' *Ricia says.* ''I am by myself once more. Are you out of the dragon, Alvarlan?''

''Aye,'' *the wizard informs her.* ''Kendrick is safely behind a ruined palace. Tell us how best to reach you.''

''You are at the time-gnawed Crown House. Before you lies the Street of the Shieldsmiths—''

Scobie's brows knitted. ''It is noonday, when elves do not fare abroad,'' *Kendrick says* remindingly, commandingly. ''I do not wish to encounter any of them. No fights, no complications. We are going to fetch you and escape, without further trouble.''

Broberg and Garcilaso showed disappointment, but understood him. A game broke down when a person refused to accept something that a fellow player tried to put in. Often the narrative threads were not mended and picked up for many days. Broberg sighed.

''Follow the street to its end at a forum where a snow fountain springs,'' *Ricia directs.* ''Cross, and continue on Aleph Zain Boulevard. You will know it by a gateway in the form of a skull with open jaws. If anywhere you see a rainbow flicker in the air, stand motionless until it has gone by, for it will be an auroral wolf . . . .''

At a low-gravity lope, the distance took some thirty minutes to cover. In the later part, the three were forced to detour by great banks of an ice so fine-grained that it slid about under their bootsoles and tried to swallow them. Several of these lay at irregular intervals around their destination.

There the travelers stood again for a time in the grip of awe.

The bowl at their feet must reach down almost to bedrock, a hundred meters, and was twice as wide. On this rim lifted the wall they had seen from the cliff, an arc fifty meters long and high, nowhere thicker than five meters, pierced by intricate scrollwork, greenly agleam where it was not translucent. It

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was the uppermost edge of a stratum which made serrations down the crater. Other outcrops and ravines were more dreamlike yet . . . was that a unicorn's head, was that a colonnade of caryatids, was that an icicle bower . . .? The depths were a lake of cold blue shadow.

"You have come, Kendrick, beloved!" *cries Ricia, and casts herself into his arms.*

"Quiet," *warns the sending of Alvarlan the wise.* "Rouse not our immortal enemies."

"Yes, we must get back." Scobie blinked. "Judas priest, what possessed us? Fun is fun, but we sure have come a lot farther and faster than was smart, haven't we?"

"Let us stay for a little while," Broberg pleaded. "This is such a miracle—the Elf King's Dance Hall, which the Lord of the Dance built for him—"

"Remember, if we stay we'll be caught, and your captivity may be forever." Scobie thumbed his main radio switch. "Hello, Mark? Do you read me?"

Neither Broberg nor Garcilaso made that move. They did not hear Danzig's voice: "Oh, yes! I've been hunkered over the set gnawing my knuckles. How are you?"

"All right. We're at the big hole and will be heading back as soon I've gotten a few pictures."

"They haven't made words to tell how relieved I am. From a scientific standpoint, was it worth the risk?"

Scobie gasped. He stared before him.

"Colin?" Danzig called. "You still there?"

"Yes. Yes."

"I asked what observations of any importance you made."

"I don't know," Scobie mumbled. "I can't remember. None of it after we started climbing seems real."

"Better you return right away," Danzig said grimly. "Forget about photographs."

"Correct." Scobie addressed his companions: "Forward march."

"I can't," *Alvarlan answers.* "A wanderin' spell has caught my spirit in tendrils of smoke."

"I know where a fire dagger is kept," *Ricia says.* "I'll try to steal it."

Broberg moved ahead, as though to descend into the crater. Tiny ice grains trickled over the verge from beneath her boots. She could easily lose her footing and slide down.

"No, wait," *Kendrick shouts to her.* "No need. My spearhead is of moon alloy. It can cut—"

The glacier shuddered. The ridge cracked asunder and fell in shards. The area on which the humans stood split free and toppled into the bowl. An avalanche poured after. High-flung crystals caught sunlight, glittered prismatic in challenge to the stars, descended slowly and lay quiet.

Except for shock waves through solids, everything had happened in the absolute silence of space.

Heartbeat by heartbeat, Scobie crawled back to his senses. He found himself held down, immobilized, in darkness and pain. His armor had saved, was still saving his life; he had been stunned but escaped a real concussion. Yet every breath hurt abominably. A rib or two on the left side seemed broken; a monstrous impact must have dented metal.

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And he was buried under more weight than he could move.

"Hello," he coughed. "Does anybody read me?" The single reply was the throb of his blood. If his radio still worked—which it should, being built into the suit—the mass around him screened him off.

It also sucked heat at an unknown but appalling rate. He felt no cold because the electrical system drew energy from his fuel cell as fast as needed to keep him warm and to recycle his air chemically. As a normal thing, when he lost heat through the slow process of radiation—and, a trifle, through kerofoam-lined bootsoles—the latter demand was much the greater. Now conduction was at work on every square centimeter. He had a spare unit in the equipment on his back, but no means of getting at it.

Unless— He barked forth a chuckle. Straining, he felt the stuff that entombed him yield the least bit under the pressure of arms and legs. And his helmet rang slightly with noise, a rustle, a gurgle. This wasn't water ice that imprisoned him, but stuff with a much lower freezing point. He was melting it, subliming it, making room for himself.

If he lay passive, he would sink, while frozenness above slid down to keep him in his grave. He might evoke superb new formations, but he would not see them. Instead, he must use the small capability given him to work his way upward, scrabble, get a purchase on matter that was not yet aflow, burrow to the stars.

He began.

Agony soon racked him. Breath rasped in and out of lungs aflame. His strength drained away and trembling took its place, and he could not tell whether he ascended or slipped back. Blind, half suffocated, Scobie made mole-claws of his hands and dug.

It was too much to endure. He fled from it—

His strong enchantments failing, the Elf King brought down his towers of fear in wreck. If the spirit of Alvarlan returned to its body, the wizard would brood upon things he had seen, and understand what they meant, and such knowledge would give mortals a terrible power against Faerie. Waking from sleep, the King scryed Kendrick about to release that fetch. There was no time to do more than break the spell which upheld the Dance Hall. It was largely built of mist and starshine, but enough blocks quarried from the cold side of Ginnungagap were in it that when they crashed they should kill the knight. Ricia would perish too, and in his quicksilver intellect the King regretted that. Nevertheless he spoke the necessary word.

He did not comprehend how much abuse flesh and bone can bear. Sir Kendrick fights his way clear of the ruins, to seek and save his lady. While he does, he heartens himself with thoughts of adventures past and future—

—and suddenly the blindness broke apart and Saturn stood lambent within rings.

Scobie belly-flopped onto the surface and lay shuddering.

He must rise, no matter how his injuries screamed, lest he melt himself a new burial place. He lurched to his feet and glared around.

Little but outcroppings and scars was left of the sculpture. For the most part,

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the crater had become a smooth-sided whiteness under heaven. Scarcity of shadows made distances hard to gauge, but Scobie guessed the new depth was about seventy-five meters. And empty, empty.

"Mark, do you hear?" he cried.

"That you, Colin?" rang in his earpieces. "Name of mercy, what's happened? I heard you call out, and saw a cloud rise and sink . . . then nothing for more than an hour. Are you okay?"

"I am, sort of. I don't see Jean or Luis. A landslide took us by surprise and buried us. Hold on while I search."

When he stood upright, Scobie's ribs hurt less. He could move about rather handily if he took care. The two types of standard analgesic in his kit were alike useless, one too weak to give noticeable relief, one so strong that it would turn him sluggish. Casting to and fro, he soon found what he expected, a concavity in the tumbled snowlike material, slightly aboil.

Also a standard part of his gear was a trenching tool. Scobie set pain aside and dug. A helmet appeared. Broberg's head was within it. She too had been tunneling out.

"Jean!"

"Kendrick!" She crept free and they embraced, suit to suit. "Oh, Colin."

"How are you?" rattled from him.

"Alive," she answered. "No serious harm done, I think. A lot to be said for low gravity . . . You? Luis?" Blood was clotted in a streak beneath her nose, and a bruise on her forehead was turning purple, but she stood firmly and spoke clearly.

"I'm functional. Haven't found Luis yet. Help me look. First, though, we'd better check out our equipment."

She hugged arms around chest, as if that would do any good here. "I'm chilled," she admitted.

Scobie pointed at a telltale. "No wonder. Your fuel cell's down to its last couple of ergs. Mine isn't in a lot better shape. Let's change."

They didn't waste time removing their backpacks, but reached into each other's. Tossing the spent units to the ground, where vapors and holes immediately appeared and then froze, they plugged the fresh ones into their suits. "Turn your thermostat down," Scobie advised. "We won't find shelter soon. Physical activity will help us keep warm."

"And require faster air recycling," Broberg reminded.

"Yeah. But for the moment, at least, we can conserve the energy in the cells. Okay, next let's check for strains, potential leaks, any kind of damage or loss. Hurry. Luis is still down there."

Inspection was a routine made automatic by years of drill. While her fingers searched across the man's spacesuit, Broberg let her eyes wander. "The Dance Hall is gone," *Ricia murmurs.* "I think the King smashed it to prevent our escape."

"Me too. If he finds out we're alive, and seeking for Alvarlan's soul— Hey, wait! None of that!"

Danzig's voice quavered. "How're you doing?"

"We're in fair shape, seems like," Scobie replied. "My corselet took a beating but didn't split or anything. Now to find Luis . . . Jean, suppose you spiral right, I left, across the crater floor."

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It took a while, for the seething which marked Garcilaso's burial was minuscule. Scobie started to dig. Broberg watched how he moved, heard how he breathed, and said, "Give me that tool. Just where are you bunged up, anyway?"

He admitted his condition and stepped back. Crusty chunks flew from Broberg's toil. She progressed fast, since whatever kind of ice lay at this point was, luckily, friable, and under Iapetan gravity she could cut a hole with almost vertical sides.

"I'll make myself useful," Scobie said, "namely, find us a way out."

When he started up the nearest slope, it shivered. All at once he was borne back in a tide that made rustly noises through his armor, while a fog of dry white motes blinded him. Painfully, he scratched himself free at the bottom and tried elsewhere. In the end he could report to Danzig: "I'm afraid there is no easy route. When the rim collapsed where we stood, it did more than produce a shock which wrecked the delicate formations throughout the crater. It let tons of stuff pour down from the surface—a particular sort of ice that, under local conditions, is like fine sand. The walls are covered by it. Most places, it lies meters deep over more stable material. We'd slide faster than we could climb, where the layer is thin; where it's thick, we'd sink."

Danzig sighed. "I guess I get to take a nice, healthy hike."

"I assume you've called for help."

"Of course. They'll have two boats here in about a hundred hours. The best they can manage. You knew that already."

"Uh-huh. And our fuel cells are good for perhaps fifty hours."

"Oh, well, not to worry about that. I'll bring extras and toss them to you, if you're stuck till the rescue party arrives. M-m-m . . . maybe I'd better rig a slingshot or something first."

"You might have a problem locating us. This isn't a true crater, it's a glorified pothole, the lip of it flush with the top of the glacier. The landmark we guided ourselves by, that fancy ridge, is gone."

"No big deal. I've got a bearing on you from the directional antenna, remember. A magnetic compass may be no use here, but I can keep myself oriented by the heavens. Saturn scarcely moves in this sky, and the sun and the stars don't move fast."

"Damn! You're right. I wasn't thinking. Got Luis on my mind, if nothing else." Scobie looked across the bleakness toward Broberg. Perforce she was taking a short rest, stoop-shouldered above her excavation. His earpieces brought him the harsh sound in her windpipe.

He must maintain what strength was left him, against later need. He sipped from his water nipple, pushed a bite of food through his chowlock, pretended an appetite. "I may as well try reconstructing what happened," he said. "Okay, Mark, you were right, we got crazy reckless. The game— Eight years was too long to play the game, in an environment that gave us too few reminders of reality. But who could have foreseen it? My God, warn *Chronos!* I happen to know that one of the Titan teams started playing an expedition to the merfolk under the Crimson

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Ocean—on account of the red mists—deliberately, like us, before they set off . . . ."

Scobie gulped. "Well," he slogged on, "I don't suppose we'll ever know exactly what went wrong here. But plain to see, the configuration was only metastable. On Earth, too, avalanches can be fatally easy to touch off. I'd guess at a methane layer underneath the surface. It turned a little slushy when temperatures rose after dawn, but that didn't matter in low gravity and vacuum—till we came along. Heat, vibration— Anyhow, the stratum slid out from under us, which triggered a general collapse. Does that guess seem reasonable?"

"Yes, to an amateur like me," Danzig said. "I admire how you can stay academic under these circumstances."

"I'm being practical," Scobie retorted. "Luis may need medical attention earlier than those boats can come for him. If so, how do we get him to ours?"

Danzig's voice turned stark. "Any ideas?"

"I'm fumbling my way toward that. Look, the bowl still has the same basic form. The whole shebang didn't cave in. That implies hard material, water ice and actual rock. In fact, I see a few remaining promontories, jutting out above the sandlike stuff. As for what *it* is—maybe an ammonia-carbon dioxide combination, maybe more exotic—that'll be for you to discover later. Right now . . . my geological instruments should help me trace where the solid masses are least deeply covered. We all have trenching tools, so we can try to shovel a path clear, along a zigzag of least effort. That may bring more garbage slipping down on us from above, but that in turn may expedite our progress. Where the uncovered shelves are too steep or slippery to climb, we can chip footholds. Slow and tough work; and we may run into a bluff higher than we can jump, or something like that."

"I can help," Danzig proposed. "While I waited to hear from you, I inventoried our stock of spare cable, cord, equipment I can cannibalize for wire, clothes and bedding I can cut into strips—whatever might be knotted together to make a rope. We won't need much tensile strength. Well, I estimate I can get about forty meters. According to your description, that's about half the slope length of that trap you're in. If you can climb halfway up while I trek there, I can haul you the rest of the way."

"Thanks, Mark" Scobie said, "although—"

"Luis!" shrieked in his helmet. "Colin, come fast, help me, this is dreadful!"

Regardless of the pain, except for a curse or two, Scobie sped to Broberg's aid.

Garcilaso was not quite unconscious. In that lay much of the horror. They heard him mumble, "—Hell, the King threw my soul into Hell. I can't find my way out, I'm lost. If only Hell weren't so cold—" They could not see his face; the inside of his helmet was crusted with frost. Deeper and longer buried than the others, badly hurt in addition, he would have died shortly after his fuel cell was exhausted. Broberg had uncovered him

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barely in time, if that.

Crouched in the shaft she had dug, she rolled him over onto his belly. His limbs flopped about and he babbled, "A demon attacks me. I'm blind here but I feel the wind of its wings," in a blurred monotone. She unplugged the energy unit and tossed it aloft, saying, "We should return this to the ship if we can."

Above, Scobie gave the object a morbid stare. It didn't even retain the warmth to make a little vapor, like his and hers, but lay quite inert. Its case was a metal box, thirty centimeters by fifteen by six, featureless except for two plug-in prongs on one of the broad sides. Controls built into the spacesuit circuits allowed you to start and stop the chemical reactions within and regulate their rate manually; but as a rule you left that chore to your thermostat and aerostat. Now those reactions had run their course. Until it was recharged, the cell was merely a lump.

Scobie leaned over to watch Broberg, some ten meters below him. She had extracted the reserve unit from Garcilaso's gear, inserted it properly at the small of his back, and secured it by clips on the bottom of his packframe. "Let's have your contribution, Colin," she said. Scobie dropped the meter of heavy-gauge insulated wire which was standard issue on extravehicular missions, in case you needed to make a special electrical connection or a repair. She joined it by Western Union splices to the two she already had, made a loop at the end and, awkwardly reaching over her left shoulder, secured the opposite end by a hitch to the top of her packframe. The triple strand bobbed above her like an antenna.

Stooping, she gathered Garcilaso in her arms. The Iapetan weight of him and his apparatus was under ten kilos, of her and hers about the same. Theoretically she could jump straight out of the hole with her burden. In practice, her spacesuit was too hampering; constant-volume joints allowed considerable freedom of movement, but not as much as bare skin, especially when circum-Saturnian temperatures required extra insulation. Besides, if she could have reached the top, she could not have stayed. Soft ice would have crumbled beneath her fingers and she would have tumbled back down.

"Here goes," she said. "This had better be right the first time, Colin. I don't think Luis can take much jouncing."

"Kendrick, Ricia, where are you?" Garcilaso moaned. "Are you in Hell too?"

Scobie dug his heels into the ground near the edge and crouched ready. The loop in the wire rose to view. His right hand grabbed hold. He threw himself backward, lest he slide forward, and felt the mass he had captured slam to a halt. Anguish exploded in his rib cage. Somehow he dragged his burden to safety before he fainted.

He came out of that in a minute. "I'm okay," he rasped at the anxious voices of Broberg and Danzig. "Only let me rest a while."

The physicist nodded and knelt to minister to the pilot. She stripped his packframe in order that he might lie flat on it, head and legs supported by the packs themselves. That would prevent significant heat loss by convection and

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cut loss by conduction. Still, his fuel cell would be drained faster than if he were on his feet, and first it had a terrible energy deficit to make up.

"The ice is clearing away inside his helmet," she reported. "Merciful Mary, the blood! Seems to be from the scalp, though: it isn't running any more. His occiput must have been slammed against the vitryl. We ought to wear padded caps in these rigs. Yes, I know accidents like this haven't happened before, but—" She unclipped the flashlight at her waist, stooped, and shone it downward. "His eyes are open. The pupils—yes, a severe concussion, and likely a skull fracture, which may be hemorrhaging into the brain. I'm surprised he isn't vomiting. Did the cold prevent that? Will he start soon? He could choke on his own vomit, in there where nobody can lay a hand on him."

Scobie's pain had subsided to a bearable intensity. He rose, went over to look, whistled, and said, "I judge he's doomed unless we get him to the boat and give him proper care soon. Which isn't possible."

"Oh, Luis." Tears ran silently down Broberg's cheeks.

"You think he can't last till I bring my rope and we carry him back?" Danzig asked.

" 'Fraid not," Scobie replied. "I've taken paramedical courses, and in fact I've seen a case like this before. How come you know the symptoms, Jean?"

"I read a lot," she said dully.

"They weep, the dead children weep," Garcilaso muttered.

Danzig sighed. "Okay, then. I'll fly over to you."

"*Huh?*" burst from Scobie, and from Broberg: "Have you also gone insane?"

"No, listen," Danzig said fast. "I'm no skilled pilot, but I have the same basic training in this type of craft that everybody does who might ride in one. It's expendable; the rescue vessels can bring us back. There'd be no significant gain if I landed close to the glacier—I'd still have to make that rope and so forth—and we know from what happened to the probe that there would be a real hazard. Better I make straight for your crater."

"Coming down on a surface that the jets will vaporize out from under you?" Scobie snorted. "I bet Luis would consider that a hairy stunt. You, my friend, would crack up."

"Nu?" They could almost see the shrug. "'A crash from low altitude, in this gravity, shouldn't do more than rattle my teeth. The blast will cut a hole clear to bedrock. True, the surrounding ice will collapse in around the hull and trap it. You may need to dig to reach the airlock, though I suspect thermal radiation from the cabin will keep the upper parts of the structure free. Even if the craft topples and strikes sidewise—in which case, it'll sink down into a deflating cushion—even if it did that on bare rock, it shouldn't be seriously damaged. It's designed to withstand heavier impacts." Danzig hesitated. "Of course, could be this would endanger you. I'm confident I won't fry you with the jets, assuming I descend near the middle and you're as far offside as you can get. Maybe, though, maybe I'd cause a . . . an ice quake that'll kill you. No sense in losing two more lives."

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"Or three, Mark," Broberg said low. "In spite of your brave words, you could come to grief yourself."

"Oh, well, I'm an oldish man. I'm fond of living, yes, but you guys have a whole lot more years due you. Look, suppose the worst, suppose I don't just make a messy landing but wreck the boat utterly. Then Luis dies, but he would anyway. You two, however, would have access to the stores aboard, including those extra fuel cells. I'm willing to run what I consider to be a small risk of my own neck, for the sake of giving Luis a chance at survival."

"Um-m-m," went Scobie, deep in his throat. A hand strayed in search of his chin, while his gaze roved around the glimmer of the bowl.

"I repeat," Danzig proceeded, "if you think this might jeopardize you in any way, we scrub it. No heroics, please. Luis would surely agree, better three people safe and one dead than four stuck with a high probability of death."

"Let me think." Scobie was mute for minutes before he said: "No, I don't believe we'd get in too much trouble here. As I remarked earlier, the vicinity has had its avalanche and must be in a reasonably stable configuration. True, ice will volatilize. In the case of deposits with low boiling points, that could happen explosively and cause tremors. But the vapor will carry heat away so fast that only material in your immediate area should change state. I daresay that the fine-grained stuff will get shaken down the slopes, but it's got too low a density to do serious harm; for the most part, it should simply act like a brief snowstorm. The floor will make adjustments, of course, which may be rather violent. However, we can be above it—do you see that shelf of rock over yonder, Jean, at jumping height? It has to be part of a buried hill; solid. That's our place to wait . . . Okay, Mark, it's go as far as we're concerned. I can't be absolutely certain, but who ever is about anything? It seems like a good bet."

"What are we overlooking?" Broberg wondered. She glanced down at Luis, who lay at her feet. "While we considered all the possibilities, Luis might die. Yes, fly if you want to, Mark, and God bless you."

But when she and Scobie had brought Garcilaso to the ledge, she gestured from Saturn to Polaris and: "I will sing a spell, I will cast what small magic is mine, in aid of the Dragon Lord, that he may deliver Alvarlan's soul from Hell," *says Ricia.*

IV

No reasonable person will blame any interplanetary explorer for miscalculations about the actual environment, especially when *some* decision has to be made, in haste and under stress. Occasional errors are inevitable. If we knew exactly what to expect thoughout the Solar System, we would have no reason to explore it.

—Minamoto

The boat lifted. Cosmic dust smoked away from its jets. A hundred and fifty meters aloft, thrust lessened and it stood still on a pillar of fire.

Within the cabin was little noise, a low hiss and a bone-deep but nearly inaudible rumble. Sweat studded Danzig's features, clung glistening to his

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beard stubble, soaked his coverall and made it reek. He was about to undertake a maneuver as difficult as a rendezvous, and without guidance.

Gingerly, he advanced a vernier. A side jet woke. The boat lurched toward a nosedive. Danzig's hands jerked across the console. He must adjust the forces that held his vessel on high and those that pushed it horizontally, to get a resultant that would carry him eastward at a slow, steady pace. The vectors would change instant by instant, as they do when a human walks. The control computer, linked to the sensors, handled much of the balancing act, but not the crucial part. He must tell it what he wanted it to do.

His handling was inexpert. He had realized it would be. More altitude would have given him more margin for error, but deprived him of cues that his eyes found on the terrain beneath and the horizon ahead. Besides, when he reached the glacier he would perforce fly low to find his goal. He would be too busy for the precise celestial navigation he could have practiced afoot.

Seeking to correct his error, he overcompensated, and the boat pitched in a different direction. He punched for "hold steady" and the computer took over. Motionless again, he took a minute to catch his breath, regain his nerve, rehearse in his mind. Biting his lip, he tried afresh. This time he did not quite approach disaster. Jets aflicker, the boat staggered drunkenly over the moonscape.

The ice cliff loomed nearer and nearer. He saw its fragile loveliness and regretted that he must cut a swathe of ruin. Yet what did any natural wonder mean unless a conscious mind was there to know it? He passed the lowest slope. It vanished in billows of steam.

Onward. Beyond the boiling, right and left and ahead, the Faerie architecture crumbled. He crossed the palisade. Now he was a bare fifty meters above the surface, and the clouds reached vengefully close before they disappeared into vacuum. He squinted through the port and made the scanner sweep a magnified overview across its screen, a search for his destination.

A white volcano erupted. The outburst engulfed him. Suddenly he was flying blind. Shocks belled through the hull when upflung stones hit. Frost sheathed the craft; the scanner screen went as blank as the ports. Danzig should have ordered ascent, but he was inexperienced. A human in danger has less of an instinct to jump than to run. He tried to scuttle sideways. Without exterior vision to aid him, he sent the vessel tumbling end over end. By the time he saw his mistake, less than a second, it was too late. He was out of control. The computer might have retrieved the situation after a while, but the glacier was too close. The boat crashed.

"Hello, Mark?" Scobie cried. "Mark, do you read me? Where are you, for Christ's sake?"

Silence replied. He gave Broberg a look which lingeréd. "Everything seemed to be in order," he said, "till we heard a shout, and a lot of racket, and nothing. He should've reached us by now. Instead, he's run into trouble. I hope it wasn't lethal."

"What can we do?" she asked as

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redundantly. They needed talk, any talk, for Garcilaso lay beside them and his delirious voice was dwindling fast.

"If we don't get fresh fuel cells within the next forty or fifty hours, we'll be at the end of our particular trail. The boat should be someplace near. We'll have to get out of this hole under our own power, seems like. Wait here with Luis and I'll scratch around for a possible route."

Scobie started downward. Broberg crouched by the pilot.

"—alone forever in the dark—" she heard.

"No, Alvarlan." She embraced him. Most likely he could not feel that, but she could. "Alvarlan, hearken to me. This is Ricia. I hear in my mind how your spirit calls. Let me help. Let me lead you back to the light."

"Have a care," advised Scobie. "We're too damn close to rehypnotizing ourselves as it is."

"But I might, I just might get through to Luis and . . . comfort him. . . . Alvarlan, Kendrick and I escaped. He's seeking a way home for us. I'm seeking you. Alvarlan, here is my hand, come take it."

On the crater floor, Scobie shook his head, clicked his tongue, and unlimbered his equipment. Binoculars would help him locate the most promising areas. Devices that ranged from a metal rod to a portable geosonar would give him a more exact idea of what sort of footing lay buried under what depth of unclimbable sand-ice. Admittedly the scope of such probes was very limited. He did not have time to shovel tons of material aside in order that he could mount higher and test further. He would simply have to get some preliminary results, make an educated guess at which path up the side of the bowl would prove negotiable, and trust he was right.

He shut Broberg and Garcilaso out of his consciousness as much as he was able, and commenced work.

An hour later, he was ignoring pain while clearing a strip across a layer of rock. He thought a berg of good, hard frozen water lay ahead, but wanted to make sure.

"Jean! Colin! Do you read?"

Scobie straightened and stood rigid. Dimly he heard Broberg: "If I can't do anything else, Alvarlan, let me pray for your soul's repose."

"Mark!" ripped from Scobie. "You okay? What the hell happened?"

"Yeah, I wasn't too badly knocked around," Danzig said, "and the boat's habitable, though I'm afraid it'll never fly again. How are you? Luis?"

"Sinking fast. All right, let's hear the news."

Danzig described his misfortune. "I wobbled off in an unknown direction for an unknown distance. It can't have been extremely far, since the time was short before I hit. Evidently I plowed into a large, um, snowbank, which softened the impact but blocked radio transmission. It's evaporated from the cabin area now. I see tumbled whiteness around, and formations in the offing . . . I'm not sure what damage the jacks and the stern jets suffered. The boat's on its side at about a forty-five degree angle, presumably with rock beneath. But the after part is still buried in less whiffable stuff—water and CO_2 ices, I think—that's reached tempera-

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ture equilibrium. The jets must be clogged with it. If I tried to blast, I'd destroy the whole works."

Scobie nodded. "You would, for sure."

Danzig's voice broke. "Oh, God, Colin! What have I done? I wanted to help Luis, but I may have killed you and Jean."

Scobie's lips tightened. "Let's not start crying before we're hurt. True, this has been quite a run of bad luck. But neither you nor I nor anybody could have known that you'd touch off a bomb underneath yourself."

"What was it? Have you any notion? Nothing of the sort ever occurred at rendezvous with a comet. And you believe the glacier is a wrecked comet, don't you?"

"Uh-huh, except that conditions have obviously modified it. The impact produced heat, shock, turbulence. Molecules got scrambled. Plasmas must have been momentarily present. Mixtures, compounds, clathrates, alloys—stuff formed that never existed in free space. We can learn a lot of chemistry here."

"That's why I came along . . . Well, then, I crossed a deposit of some substance or substances that the jets caused to sublime with tremendous force. A certain kind of vapor refroze when it encountered the hull. I had to defrost the ports from inside after the snow had cooked off them."

"Where are you in relation to us?"

"I told you, I don't know. And I'm not sure I can determine it. The crash crumpled the direction-finding antenna. Let me go outside for a better look."

"Do that," Scobie said. "I'll keep busy meanwhile."

He did, until a ghastly rattling noise and Broberg's wail brought him at full speed back to the rock.

Scobie switched off Garcilaso's fuel cell. "This may make the difference that carries us through," he said low. "Think of it as a gift. Thanks, Luis."

Broberg let go of the pilot and rose from her knees. She straightened the limbs that had threshed about in the death struggle and crossed his hands on his breast. There was nothing she could do about the fallen jaw or the eyes that glared at heaven. Taking him out of this suit, here, would have worsened his appearance. Nor could she wipe the tears off her own face. She could merely try to stop their flow. "Goodbye, Luis," she whispered.

Turning to Scobie, she asked, "Can you give me a new job? Please."

"Come along," he directed. "I'll explain what I have in mind about making our way to the surface."

They were midway across the bowl when Danzig called. He had not let his comrade's dying slow his efforts, nor said much while it happened. Once, most softly, he had offered Kaddish.

"No luck," he reported like a machine. "I've traversed the largest circle I could while keeping the boat in sight, and found only weird, frozen shapes. I can't be a huge distance from you, or I'd see an identifiably different sky, on this miserable little ball. You're probably within a twenty or thirty kilometer radius of me. But that covers a bunch of territory."

"Right," Scobie said. "Chances are you can't find us in the time we've got. Return to the boat."

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"Hey, wait," Danzig protested. "I can spiral onward, marking my trail. I might come across you."

"It'll be more useful if you return," Scobie told him. "Assuming we climb out, we should be able to hike to you, but we'll need a beacon. What occurs to me is the ice itself. A small energy release, if it's concentrated, should release a large plume of methane or something similarly volatile. The gas will cool as it expands, recondense around dust particles that have been carried along—it'll steam—and the cloud ought to get high enough, before it evaporates again, to be visible from here."

"Gotcha!" A tinge of excitement livened Danzig's words. "I'll go straight to it. Make tests, find a spot where I can get the showiest result, and . . . how about I rig a thermite bomb? No, that might be too hot. Well, I'll develop a gadget."

"Keep us posted."

"But I, I don't think we'll care to chatter idly," Broberg ventured.

"No, we'll be working our tails off, you and I," Scobie agreed.

"Uh, wait," said Danzig. "What if you find you can't get clear to the top? You implied that's a distinct possibility."

"Well, then it'll be time for more radical procedures, whatever they turn out to be," Scobie responded. "Frankly, at this moment my head is too full of . . . of Luis, and of choosing an optimum escape route, for much thought about anything else."

"M-m, yeah, I guess we've got an ample supply of trouble without borrowing more. Tell you what, though. After my beacon's ready to fire off, I'll make that rope we talked of. You might find you prefer having it to clean clothes and sheets when you arrive." Danzig was silent for seconds before he ended: "God damn it, you *will* arrive."

Scobie chose a point on the north side for his and Broberg's attempt. Two rock shelves jutted forth, near the floor and several meters higher, indicating that stone reached at least that far. Beyond, in a staggered pattern, were similar outcroppings of hard ices. Between them, and onward from the uppermost, which was scarcely more than halfway to the rim, was nothing but the featureless, footingless slope of powder crystals. Its angle of repose gave a steepness that made the surface doubly treacherous. The question, unanswerable save by experience, was how deeply it covered layers on which humans could climb, and whether such layers extended the entire distance aloft.

At the spot, Scobie signalled a halt. "Take it easy, Jean," he said. "I'll go ahead and commence digging."

"Why don't we go together? I have my own tool, you know."

"Because I can't tell how so large a bank of that pseudo-quicksand will behave. It might react to the disturbance by causing a gigantic slide."

She bridled. Her haggard countenance registered mutiny. "Why not me first, then? Do you suppose I always wait passive for Kendrick to save me?"

"As a matter of fact," he rapped, "I'll begin because my rib is giving me billy hell, which is eating away what strength I've got left. If we run into trouble, you can better come to my help than I to yours."

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Broberg bent her neck. "Oh. I'm sorry. I must be in a fairly bad state myself, if I let false pride interfere with our business." Her look went toward Saturn, around which *Chronos* orbited, bearing her husband and children.

"You're forgiven." Scobie bunched his legs and sprang the five meters to the lower ledge. The next one up was slightly too far for such a jump, when he had no room for a running start.

Stooping, he scraped his trenching tool against the bottom of the declivity that sparkled before him, and shoveled. Grains poured from above, a billionfold, to cover what he cleared. He worked like a robot possessed. Each spadeful was nearly weightless, but the number of spadefuls was nearly endless. He did not bring the entire bowlside down on himself as he had half feared, half hoped. (If that didn't kill him, it would save a lot of toil.) A dry torrent went right and left over his ankles. Yet at last somewhat more of the underlying rock began to show.

From beneath, Broberg listened to him breathe. It sounded rough, often broken by a gasp or a curse. In his spacesuit, in the raw, wan sunshine, he resembled a knight who, in despite of wounds, did battle against a monster.

"All right," he called at last. "I think I've learned what to expect and how we should operate. It'll take the two of us."

"Yes . . . oh, yes, my Kendrick."

The hours passed. Ever so slowly, the sun climbed and the stars wheeled and Saturn waned.

Most places, the humans labored side by side. They did not require more than the narrowest of lanes, but unless they cut it wide to begin with, the banks to right and left would promptly slip down and bury it. Sometimes the conformation underneath allowed a single person at a time to work. Then the other could rest. Soon it was Scobie who must oftenest take advantage of that. Sometimes they both stopped briefly, for food and drink and reclining on their packs.

Rock yielded to water ice. Where this rose very sharply, the couple knew it, because the sand-ice that they undercut would come down in a mass. After the first such incident, when they were nearly swept away, Scobie always drove his geologist's hammer into each new stratum. At any sign of danger, he would seize its handle and Broberg would cast an arm around his waist. Their other hands clutched their trenching tools. Anchored, but forced to strain every muscle, they would stand while the flood poured around them, knee-high, once even chest-high, seeking to bury them irretrievably deep in its quasi-fluid substance. Afterward they would confront a bare stretch. It was generally too steep to climb unaided, and they chipped footholds.

Weariness was another tide to which they dared not yield. At best, their progress was dismayingly slow. They needed little heat input to keep warm, except when they took a rest, but their lungs put a furious demand on air recyclers. Garcilaso's fuel cell, which they had brought along, could give a single person extra hours of life, though depleted as it was after coping with his hypothermia, the time would be insufficient for rescue by the teams from *Chronos*. Unspoken was the idea of taking turns

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with it. That would put them in wretched shape, chilled and stifling, but at least they would leave the universe together.

Thus it was hardly a surprise that their minds fled from pain, soreness, exhaustion, stench, despair. Without that respite, they could not have gone on as long as they did.

At ease for a few minutes, their backs against a blue-shimmering parapet which they must scale, they gazed across the bowl, where Garcilaso's suited body gleamed like a remote pyre, and up the curve opposite to Saturn. The planet shone lambent amber, softly banded, the rings a coronet which a shadow band across their arc seemed to make all the brighter. That radiance overcame sight of most nearby stars, but elsewhere they arrayed themselves multitudinous, in splendor, around the silver road which the galaxy clove between them.

"How right a tomb for Alvarlan," *Ricia says in a dreamer's murmur.*

"Has he died, then?" *Kendrick asks.*

"You do not know?"

"I have been too busied. After we won free of the ruins and I left you to recover while I went scouting, I encountered a troop of warriors. I escaped, but must needs return to you by devious, hidden ways." *Kendrick strokes Ricia's sunny hair.* "Besides, dearest dear, it has ever been you, not I, who had the gift of hearing spirits."

"Brave darling . . . Yes, it is a glory to me that I was able to call his soul out of Hell. It sought his body, but that was old and frail and could not survive the knowledge it now had. Yet Alvarlan passed peacefully, and before he did, for his last magic he made himself a tomb from whose ceiling starlight will eternally shine."

"May he sleep well. But for us there is no sleep. Not yet. We have far to travel."

"Aye. But already we have left the wreckage behind. Look! Everywhere around in this meadow, anemones peep through the grass. A lark sings above."

"These lands are not always calm. We may well have more adventures ahead of us. But we shall meet them with high hearts."

Kendrick and Ricia rise to continue their journey.

Cramped on a meager ledge, Scobie and Broberg shoveled for an hour without broadening it much. The sand-ice slid from above as fast as they could cast it down. "We'd better quit this as a bad job," the man finally decided. "The best we've done is flatten the slope ahead of us a tiny bit. No telling how far inward the shelf goes before there's a solid layer on top. Maybe there isn't any."

"What shall we do instead?" Broberg asked in the same worn tone.

He jerked a thumb. "Scramble back to the level beneath and try a different direction. But first we absolutely require a break."

They spread kerofoam pads and sat. After a while during which they merely stared, stunned by fatigue, Broberg spoke.

"I go to the brook," *Ricia relates.* "It chimes under arches of green boughs. Light falls between them to sparkle on it. I kneel and drink. The water is cold, pure, sweet. When I raise my eyes, I see the figure of a young woman, naked, her tresses the color of leaves. A

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wood nymph. She smiles."

"Yes, I see her too," *Kendrick joins in.* "I approach carefully, not to frighten her off. She asks our names and errands. We explain that we are lost. She tells us how to find an oracle which may give us counsel."

They depart to find it.

Flesh could no longer stave off sleep. "Give us a yell in an hour, will you, Mark?" Scobie requested.

"Sure," Danzig said, "but will that be enough?"

"It's the most we can afford, after the setbacks we've had. We've come less than a third of the way."

"If I haven't talked to you," Danzig said slowly, "it's not because I've been hard at work, though I have been. It's that I figured you two were having a plenty bad time without me nagging you. However—do you think it's wise to fantasize the way you have been?"

A flush crept across Broberg's cheeks and down toward her bosom. "You listened, Mark?"

"Well, yes, of course. You might have an urgent word for me at any minute—"

"Why? What could you do? A game is a personal affair."

"Uh, yes, yes—"

Ricia and Kendrick have made love whenever they can. The accounts were never explicit, but the words were often passionate.

"We'll keep you tuned in when we need you, like for an alarm clock," Broberg clipped. "Otherwise we'll cut the circuit."

"But—Look, I never meant to—"

"I know," Scobie sighed. "You're a nice guy and I daresay we're overreacting. Still, that's the way it's got to be. Call us when I told you."

Deep within the grotto, the Pythoness sways on her throne, in the ebb and flow of her oracular dream. As nearly as Ricia and Kendrick can understand what she chants, she tells them to fare westward on the Stag Path until they meet a one-eyed graybeard who will give them further guidance; but they must be wary in his presence, for he is easily angered. They make obeisance and depart. On their way out, they pass the offering they brought. Since they had little with them other than garments and his weapons, the Princess gave the shrine her golden hair. The knight insists that, close-cropped, she remains beautiful.

"Hey, whoops, we've cleared us an easy twenty meters," Scobie said, albeit in a voice which weariness had hammered flat. *At first, the journey through the land of Nacre is a delight.*

His oath afterward had no more life in it. "Another blind alley, seems like." *The old man in the blue cloak and wide-brimmed hat was indeed wrathful when Ricia refused him her favors and Kendrick's spear struck his own aside. Cunningly, he has pretended to make peace and told them what road they should next take. But at the end of it are trolls. The wayfarers elude them and double back.*

"My brain's stumbling around in a fog," Scobie groaned. "My busted rib isn't exactly helping, either. If I don't get another nap I'll keep on making misjudgments till we run out of time."

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"By all means, Colin," Broberg said. "I'll stand watch and rouse you in an hour."

"What?" he asked in dim surprise. "Why not join me and have Mark call us as he did before?"

She grimaced. "No need to bother him. I'm tired, yes, but not sleepy."

He lacked wit or strength to argue. "Okay," he said. He stretched his insulating pad on the ice, and toppled out of awareness.

Broberg settled herself next to him. They were halfway to the heights, but they had been struggling, with occasional breaks, for more than twenty hours, and progress grew harder and trickier even as they themselves grew weaker and more stupefied. If ever they reached the top and spied Danzig's signal, they would have something like a couple of hours' stiff travel to shelter.

Saturn, sun, stars shone through vitryl. Broberg smiled down at Scobie's face. He was no Greek god. Sweat, grime, unshavenness, the manifold marks of exhaustion were upon him, but— For that matter, she was scarcely an image of glamour herself.

Princess Ricia sits by her knight, where he slumbers in the dwarf's cottage, and strums a harp the dwarf lent her before he went off to his mine, and sings a lullaby to sweeten the dreams of Kendrick. When it is done, she passes her lips lightly across his, and drifts into the same gentle sleep.

Scobie woke a piece at a time. "Ricia, beloved," *Kendrick whispers, and feels after her. He will summon her up with kisses—*

He scrambled to his feet. "Judas priest!" She lay unmoving. He heard her breath in his earplugs, before the roaring of his pulse drowned it. The sun glared farther aloft, he could see it had moved, and Saturn's crescent had thinned more, forming sharp horns at its ends. He forced his eyes toward the watch on his left wrist.

"Ten hours," he choked.

He knelt and shook his companion. "Come, for Christ's sake!" Her lashes fluttered. When she saw the horror on his visage, drowsiness fled from her.

"Oh, no," she said. "Please, no."

Scobie climbed stiffly erect and flicked his main radio switch. "Mark, do you receive?"

"Colin!" Danzig chattered. "Thank God! I was going out of my head from worry."

"You're not off that hook, my friend. We just finished a ten-hour snooze."

"What? How far did you get first?"

"To about forty meters' elevation. The going looks tougher ahead than in back. I'm afraid we won't make it."

"Don't *say* that, Colin," Danzig begged.

"My fault," Broberg declared. She stood rigid, fists doubled, her features a mask. Her tone was steely. "He was worn out, had to have a nap. I offered to wake him, but fell asleep myself."

"Not your fault, Jean," Scobie began.

She interrupted: "Yes. Mine. Perhaps I can make it good. Take my fuel cell. I'll still have deprived you of my help, of course, but you might survive and reach the boat anyway."

He seized her hands. They did not unclench. "If you imagine I could do that—"

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"If you don't, we're both finished," she said unbendingly. "I'd rather go out with a clear conscience."

"And what about my conscience?" he shouted. Checking himself, he wet his lips and said fast: "Besides, you're not to blame. Sleep slugged you. If I'd been thinking, I'd have realized it was bound to do so, and contacted Mark. The fact that you didn't either shows how far gone you were yourself. And . . . you've got Tom and the kids waiting for you. Take my cell." He paused. "And my blessing."

"Shall Ricia forsake her true knight?"

"Wait, hold on, listen," Danzig called. "Look, this is terrible, but—oh, hell, excuse me, but I've got to remind you that dramatics only clutter the action. From what descriptions you've sent, I don't see how either of you can possibly proceed solo. Together, you might yet. At least you're rested—sore in the muscles, no doubt, but clearer in the head. The climb before you may prove easier than you think. Try!"

Scobie and Broberg regarded each other for a whole minute. A thawing went through her, and warmed him. Finally they smiled and embraced. "Yeah, right," he growled. "We're off. But first a bite to eat. I'm plain, old-fashioned hungry. Aren't you?" She nodded.

"That's the spirit," Danzig encouraged them. "Uh, may I make another suggestion? I am just a spectator, which is pretty hellish but does give me an overall view. Drop that game of yours."

Scobie and Broberg tautened.

"It's the real culprit," Danzig pleaded. "Weariness alone wouldn't have clouded your judgment. You'd never have cut me off, and— But weariness and shock and grief did lower your defenses to the point where the damned game took you over. You weren't yourselves when you fell asleep. You were those dream-world characters. They had no reason not to cork off!"

Broberg shook her head violently. "Mark," said Scobie, "you are correct about being a spectator. That means there are some things you don't understand. Why subject yourself to the torture of listening in, hour after hour? We'll call you back from time to time, naturally. Take care." He broke the circuit.

"He's wrong," Broberg insisted.

Scobie shrugged. "Right or wrong, what difference? We won't pass out again in the time we have left. The game didn't handicap us as we traveled. In fact, it helped, by making the situation feel less gruesome."

"Aye. Let us break our fast and set forth anew on our pilgrimage."

The struggle grew stiffer. "Belike the White Witch has cast a spell on this road," *says Ricia.*

"She shall not daunt us," *vows Kendrick.*

"No, never while we fare side by side, you and I, noblest of men."

A slide overcame them and swept them back a dozen meters. They lodged against a crag. After the flow had passed by, they lifted their bruised bodies and limped in search of a different approach. The place where the geologist's hammer lay was no longer accessible.

"What shattered the bridge?" *asks Ricia.*

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"A giant," *answers Kendrick.* "I saw him as I fell into the river. He lunged at me, and we fought in the shallows until he fled. He bore away my sword in his thigh."

"You have your spear that Wayland forged," *Ricia says,* "and always you have my heart."

They stopped on the last small outcrop they uncovered. It proved to be not a shelf but a pinnacle of water ice. Around it glittered sand-ice, again quiescent. Ahead was a slope thirty meters in length, and then the rim, and stars.

The distance might as well have been thirty light-years. Whoever tried to cross would immediately sink to an unknown depth.

There was no point in crawling back down the bared side of the pinnacle. Broberg had clung to it for an hour while she chipped niches to climb by with her knife. Scobie's condition had not allowed him to help. If they sought to return, they could easily slip, fall, and be engulfed. If they avoided that, they would never find a new path. Less than two hours' worth of energy was left in their fuel cells. Attempting to push onward while swapping Garcilaso's back and forth would be an exercise in futility.

They settled themselves, legs dangling over the abyss, and held hands.

"I do not think the orcs can burst the iron door of this tower," *Kendrick says,* "but they will besiege us until we starve to death."

"You never yielded up your hope ere now, my knight," *replies Ricia, and kisses his temple.* "Shall we search about? These walls are unutterably ancient. Who knows what relics of wizardry lie forgotten within? A pair of phoenix-feather cloaks, that will bear us laughing through the sky to our home—?"

"I fear not, my darling. Our weird is upon us." *Kendrick touches the spear that leans agleam against the battlement.* "Sad and gray will the world be without you. We can but meet our doom bravely."

"Happily, since we are together." *Ricia's gamin smile breaks forth.* "I did notice that a certain room holds a bed. Shall we try it?"

Kendrick frowns. "Rather should we seek to set our minds and souls in order."

She tugs his elbow. "Later, yes. Besides—who knows?—when we dust off the blanket, we may find it is a Tarnkappe that will take us invisible through the enemy."

"You dream."

Fear stirs behind her eyes. "What if I do?" *Her words tremble.* "I can dream us free if you will help."

Scobie's fist smote the ice. "No!" he croaked. "I'll die in the world that is."

Ricia shrinks from him. He sees terror invade her. "You, you rave, beloved," *she stammers.*

He twisted about and caught her by the arms. "Don't you want to remember Tom and your boys?"

"Who—?"

Kendrick slumps. "I don't know. I have forgotten too."

She leans against him, there on the windy height. A hawk circles above. "The residuum of an evil enchantment,

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surely. Oh, my heart, my life, cast it from you! Help me find the means to save us." *Yet her entreaty is uneven, and through it speaks dread.*

Kendrick straightens. He lays hand on Wayland's spear, and it is as though strength flows thence, into him. "A spell in truth," *he says. His tone gathers force.* "I will not abide in its darkness, nor suffer it to blind and deafen you, my lady." *His gaze takes hold of hers, which cannot break away.* "There is but a single road to our freedom. It goes through the gates of death."

She waits, mute and shuddering.

"Whatever we do, we must die, Ricia. Let us fare hence as our own folk."

"I—no—I won't—I will—"

"You see before you the means of your deliverance. It is sharp, I am strong, you will feel no pain."

She bares her bosom. "Then quickly, Kendrick, before I am lost!"

He drives the weapon home. "I love you," he says. *She sinks at his feet.* "I follow you, my darling," *he says, withdrawing the steel, bracing the shaft against stone, and lunging forward. He falls beside her.* "Now we are free."

"That was . . . a nightmare." Broberg sounded barely awake.

Scobie's voice shook. "Necessary, I think, for both of us." He gazed straight before him, letting Saturn fill his eyes with dazzle. "Else we'd have stayed . . . insane? Maybe not, by definition. But we'd not have been in reality either."

"It would have been easier," she mumbled. "We'd never have known we were dying."

"Would you have preferred that?"

Broberg shivered. The slackness in her countenance gave place to the same tension that was in his. "Oh, no," she said, quite softly but in the manner of full consciousness. "No, you were right, of course. Thank you for your courage."

"You've always had as much guts as anybody, Jean. You just have more imagination than me." Scobie's hand chopped empty space in a gesture of dismissal. "Okay, we should call poor Mark and let him know. But first—" His words lost the cadence he had laid on them. "First—"

Her glove clasped his. "What, Colin?"

"Let's decide about that third unit—Luis's," he said with difficulty, still confronting the great ringed planet. "Your decision, actually, though we can discuss the matter if you want. I will not hog it for the sake of a few more hours. Nor will I share it; that would be a nasty way for us both to go out. However, I suggest you use it."

"To sit beside your frozen corpse?" she replied. "No. I wouldn't even feel the warmth, not in my bones—"

She turned toward him so fast that she nearly fell off the pinnacle. He caught her. *"Warmth!"* she screamed, shrill as the cry of a hawk on the wing. "Colin, we'll take our bones home!"

"In point of fact," said Danzig, "I've climbed onto the hull. That's high enough for me to see over those ridges and needles. I've got a view of the entire horizon."

"Good," grunted Scobie. "Be prepared to survey a complete circle quick. This depends on a lot of factors we can't

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predict. The beacon will certainly not be anything like as big as what you had arranged. It may be thin and short-lived. And, of course, it may rise too low for sighting at your distance." He cleared his throat. "In that case, we two have bought the farm. But we'll have made a hell of a try, which feels great by itself."

He hefted the fuel cell, Garcilaso's gift. A piece of heavy wire, insulation stripped off, joined the prongs. Without a regulator, the unit poured its maximum power through the short circuit. Already the strand glowed.

"Are you sure you don't want me to do it, Colin?" Broberg asked. "Your rib—"

He made a lopsided grin. "I'm nonetheless better designed by nature for throwing things," he said. "Allow me that much male arrogance. The bright idea was yours."

"It should have been obvious from the first," she said. "I think it would have been, if we weren't bewildered in our dream."

"M-m, often the simple answers are the hardest to find. Besides, we had to get this far or it wouldn't have worked, and the game helped mightily . . . Are you set, Mark? Heave ho!"

Scobie cast the cell as if it were a baseball, hard and far through the Iapetan gravity field. Spinning, its incandescent wire wove a sorcerous web across vision. It landed somewhere beyond the rim, on the glacier's back.

Frozen gases vaporized, whirled aloft, briefly recondensed before they were lost. A geyser stood white against the stars.

"I see you!" Danzig yelped. "I see your beacon, I've got my bearing, I'll be on my way! With rope and extra energy units and everything!"

Scobie sagged to the ground and clutched at his left side. Broberg knelt and held him, as if either of them could lay hand on his pain. No large matter. He would not hurt much longer.

"How high would you guess the plume goes?" Danzig inquired, calmer.

"About a hundred meters," Broberg replied after study.

"Oh, damn, these gloves do make it awkward punching the calculator . . . . Well, to judge by what I observe of it, I'm between ten and fifteen klicks off. Give me an hour or a tad more to get there and find your exact location. Okay?"

Broberg checked gauges. "Yes, by a hair. We'll turn our thermostats down and sit very quietly to reduce oxygen demand. We'll get cold, but we'll survive."

"I may be quicker," Danzig said. "That was a worst-case estimate. All right, I'm off. No more conversation till we meet. I won't take any foolish chances, but I will need my wind for making speed."

Faintly, those who waited heard him breathe, heard his hastening footfalls. The geyser died.

They sat, arms around waists, and regarded the glory which encompassed them. After a silence, the man said: "Well, I suppose this means the end of the game. For everybody."

"It must certainly be brought under strict control," the woman answered. "I wonder, though, if they will abandon it altogether—out here."

"If they must, they can."

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"Yes. We did, you and I, didn't we?"

They turned face to face, beneath that star-beswarmed, Saturn-ruled sky. Nothing tempered the sunlight that revealed them to each other, she a middle-aged wife, he a man ordinary except for his aloneness. They would never play again. They could not.

A puzzled compassion was in her smile. "Dear friend—" she began.

His uplifted palm warded her from further speech. "Best we don't talk unless it's essential," he said. "That'll save a little oxygen, and we can stay a little warmer. Shall we try to sleep?"

Her eyes widened and darkened. "I dare not," she confessed. "Not till enough time has gone past. Now, I might dream." ■

WE'D LIKE YOUR HELP IN EDITING THIS MAGAZINE.

Should *Analog* publish more science fact articles? Since we must hold to a 178-page format, more *fact* would mean less *fiction;* but we'll do our best to comply if the interest is there. Please indicate your opinion on the form below—or on a separate piece of paper—and send to:

analog SCIENCE FICTION SCIENCE FACT

"FACT" SURVEY

380 LEXINGTON AVENUE
NEW YORK, NY 10017

I'd like to see Analog publish

- ☐ more science fact
- ☐ less science fact
- ☐ about the same amount of science fact

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MOSTLY MEANTIME

Jack Wodhams

You think you have problems with deliveries now?
Wait till we're doing things on a big scale.

From: Gadsbrill F. O'Haku,
3, Tallahassee Promenade,
BACKBO, Outer Pale,
Antares 3-9-za/B2/f 57.
6-5-2098

To: Coldstar SlammerTrak,
40/9297 Bronx Elysé,
NEW YORK, U.S.A., Homearth.

Dear Sirs,

The Fairfield slide on my SlammTrak Model HG/MastaFlite Transporter has become irreparably distorted through a failure of adhesion by its corresponding neutron magnetizer. The unit has given very satisfactory service, and I would very much like to repair the fault, to enable its useful functioning to be resumed. If, therefore, you could forward to me soonest replacements for the reciprocating parts concerned, I should be most grateful. You may charge the family account at Huntley's Allworlds Clearing Bank, using this advice as your authority.

Yours sincerely,
G. F. O'Haku.

From: HOTZIG SLAMTRAKIN,
666 Milesanmiles Strada,
MILANO 5050 i11A
Co-Itali, Homearth.
22/10/2221

To: G. F. O'Haku, 3, Tallahassee Prom.,
Backbo, Outer Pale, ANTARES 3-9-za/B2/f 57

Dear Sr. O'Haku, or kin,

Unfortunately your note of some century or so ago was conveyed upon a vessel that was commandeered to become involved in the somewhat prolonged Orion Disputations and, as a result, has arrived at our new office a degree later than might have been anticipated. However, the matter is now receiving top priority. Regrettably we no longer manufacture the model you mention—it has long been obsolete—and to this time we have been unable to run to ground those parts to which you referred. However, we suggest that you might adapt a solar-coil inducer and Maxplate Planke of more modern design and efficiency, which might help you to overcome your problem. We enclose plans and details which suggest how best such modification might be accomplished.

Looking forward to doing business with you,

To our accord,
Jeevanni Mi (Asst. Prom. Mngr. Sales)

From: Aylo M. Whakua,
18/18 Threehi,
17th. District,
INNER PALE,

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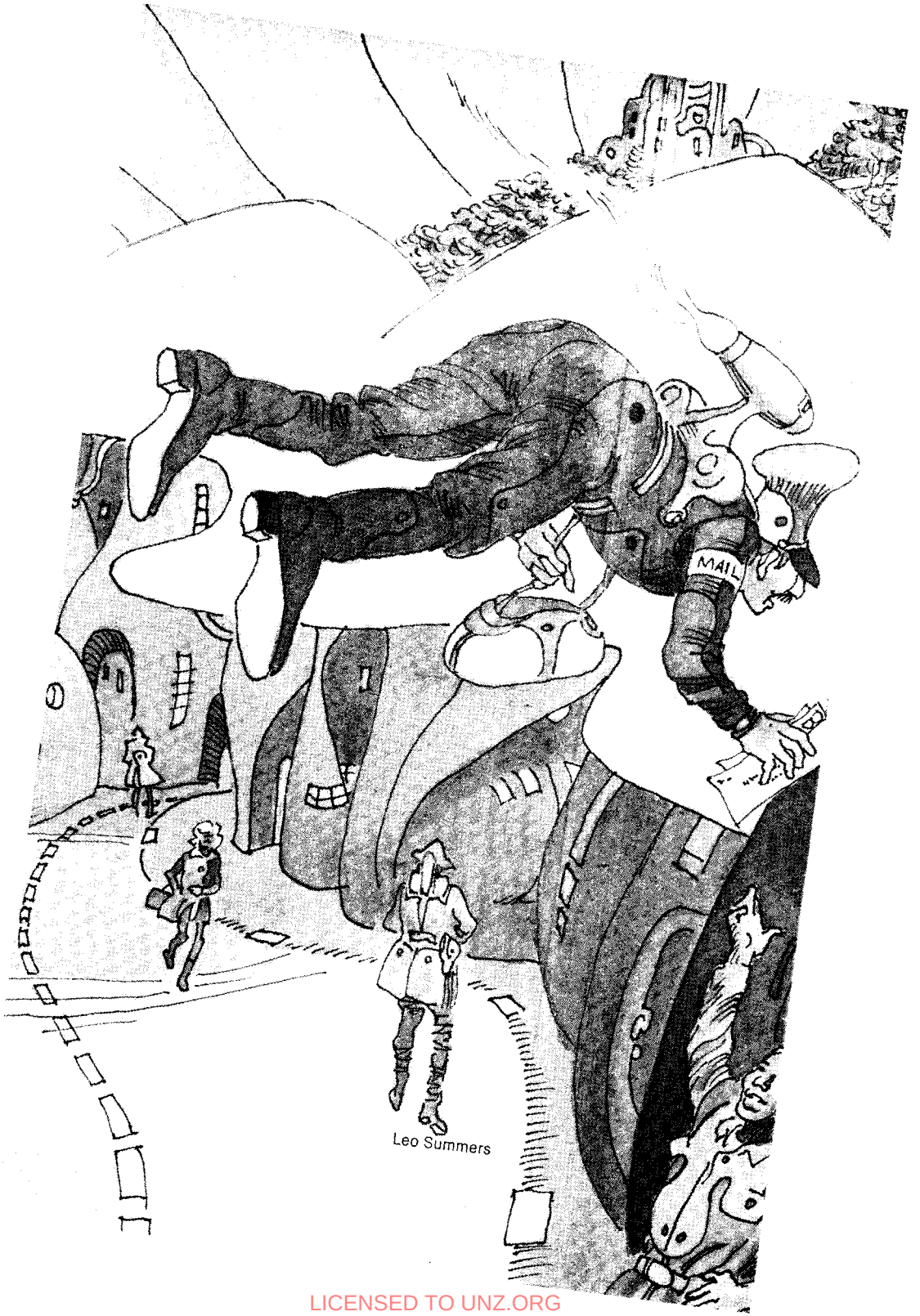

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Antares 3-9-za/B2/f 57
13-6-2363

To: Hotzig Slamtrakin, Milano 5050 i11A,
Co-Itali, Homearth.
Dear Sir,

Owing to a cross-warp at the Capella TruRelai/Zapost Intersection, your response to my ancestor's query arrived even later than might have been expected. Nevertheless a search has revealed that the family does indeed still possess a SlammTrak Model HG/Mastaflite Transporter on the property we own at Backbo, and that it is still in quite good repair, aside from the parts described in my ancestor's original letter. We feel, for historical reasons, that it would be a good idea to try and get this old machine functioning again, and would appreciate your forwarding the Solar Coil Inducer and Maxplate Planke, as referred to in your last missive, if still available. You may draw on the family credit line at AllCosmos Inc. for expenses, in the usual format.

With thanks, and enduringly yours,
Aylo M. W.

From: The People's Hotzlamtrak,
Amsterdam Boulevarde,
332 4th. Division,
Europe Central, Homearth.
Speedline:- HOTPOP H.E.
9/9/2460

To: 18-18 Aylo Threehi, 17th. Dis.,
INNER PALE, 3-9-sa/B2/f 57
Comrade,

Due to circumstances beyond our control we have been unable to immediately fulfil your desires. Much to blame has been the thoughtlessness of neo-capitalistic self-interest and, as you may be aware, there has been considerable disruption in this area caused by notorious revisionists, vile reactionaries, and other enemies of the people. But at last your affairs are in the hands of competent workers who care. Stability has now been restored, and the plant and services of The People's Hotzlamtrak has been adequately reformulated from its warmongering deviationalism to once more provide goods for peaceloving workers everywhere. It is my pleasure to inform you that we have a limited stock of the discontinued line in Solar Coil Inducers and Maxplate Planke responders. I enclose the necessary forms to assist your obtaining the necessary tariff subsidy declaration, clearance papers for non-offensive materiel, usage justification, export license, and warranty of non-repercussive action in event of any default or operational disparity. Trusting that you will honor us with your custom, comrade— Forward with the flag!

Stalin K. Ching, 3rd. Mobile Allotment,

Commissar-in-Readiness and holder of The Fist of Love.

From: Gwelola Sheher Smyte-Wakua,
9/7 Twelvi,
4th. District,
UPPER PALE,
Antares 3-9-za/B2/f 57
31-2-2579

To: HOTPOP H.E.
Dear Comrade,

How nice to hear from you at last. What a pity it was that you made a couple of slight errors in the address of your last communication. Do you know, I believe that that letter must have gone to just about every other Inner Pale in the galaxy before it came here. It even

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went to Cygnus, which, as you know, has a terrible reputation for dilatoriness and the gross negligence of its dead-letter office. But be that as it may, I have looked up our previous correspondence in our archives, and how fascinating it all is. The original transporter thing is quite an antique now, and has much amused my nephew, who went all the way out to Backbo just to rediscover it in a long-disused insulator shaft. Quite like a treasure-trove, really, and quite a touching link with the past. How brave the early pioneers must have been. I am quite humbled that a forebear of mine carved his niche with such primitive tools and with such basic aids as your transporter thing. My nephew would dearly like to get the device working again—you know how enthusiastic young men can get over such things!—and while he would much prefer to obtain original replacements, he agrees that the alternative substitute would serve in the meantime, if only to enable him to move the thing to a more convenient site. Therefore we have appropriately filled in the forms that you kindly supplied, and we hope that you may be able to convey to us the items in question per Galaxo Supalitefrate as quickly as may be convenient.

Yours with warmth,
Gwelola Sheher Smyte-Wakua.

From: Shalomtrek H.O.
G.T.C.A. Building,
Gurionville, New Israel,
Homearth.
FLASH:
33867HJ90cX02585KM329P40/1
3/9/2664

To: G.S. Smyte-Wakua, 9/7 Twelvi,
4th. District, UPPER PALE,
Antares 3-9-za/B2/f 57

Greetings already, you poor girl,

What can I say, I ask you? Here we got troubles enough, our beautiful files, so long preserved, getting blown up by extremists who thought we were helping the Britgungs. May I drop dead if I tell a lie, things have been going on here like you wouldn't believe. The resistance to recovery and relocation has made many holes, you read the news, you should know. I thank God my dear mother never lived to see it, the conflict, the tragedy, oy-yoy, it would break your heart. Also you should know since from takeover bids, you got it? and the plant moving, and the cheap labor, when you can get it, what does it do but get united sudden, to putting on screws for more recognition through higher credit. So whatever quote you got, for whatever it is you wanted, the price will be at least five times and, as a man of honor, I swear to God, my own children will go hungry even at that. I trust you, why not? but the lapse in time, you have changed your mind, maybe, or gone broke, it has happened to the best, so what the cost of a friendly inquiry, hey? for supplying us certain confirmation. And like also, no offense, but the Galaxo mob no longer operates since it goes bust when its chairman gravitates Out with the bulk of its C.O.D. back in '17. So an alternative fund source is, if you don't mind, and please excuse me, desirable—okay? Anytime, we're never too busy, gladly, call us anytime.

Our Blessing,
Fred McBergley, O.W. Liaison.

P.S: Nobody has used the time-shut Speedline since around 2560, when its

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Central Diverter regurged on its scrambler and, like, I mean, they can come in anywhen. Be advised.

From: Lairdie Wukwa 11,
No. 1, Centi-Centi,
1st. District, Dom Pale,
Antares 3-9-za/B2/f 57
11/11/2736

FLASH:
33867HJ90cX02585KM329P40/1

To whom it may concern,

In the matter of the relic that was the SlammTrak Model HG/Mastaflite Transporter. His Highness wishes me to inform you that his uncle, the late beloved Lairdie Smyte of the Middle Bracket, impatient of delay, himself had parts specially created to repair the device. Our technology at the time proved equal to the task, and, indeed, this experiment was a turning point, initiating as it did a manufacturing capacity that has since transformed us from a wholly importing systems inductor to one that is now producing its own version of the model HG for export, there being a ready market for such an item in societies primitive and at the beginnings of their establishment. Our government has taken out Latter Day Improvement Patents upon the said item, and it should also be noted that the Manifest System and its Material Styling has been recorded and is protected by the Pioneer Vintage Preservation Act of 2683. Should you receive any requests for spare parts for this model, we should be pleased to recognize you as our agent, and to grant you the usual commission that you might receive from such sales. You may contact Backbo Enterprises direct, at Backbo, Outer Pale, here. How thankful we all are that the interminable postal strike has finally ended. Had we known, we would have sent our condolences regarding your mother so very much sooner.

On behalf of His Highness, Wukwa 11,

Razon Detter, Imperial Secretary.

From: Schmitten Alltrak Units,
Quality New & Used Spares,
Lot 815
Pinegum City
East Ayers, Australia, H.E.
23/6/2829

To: Backbo Enterprises, BACKBO,
Outer Pale, Antares 3-9-za/B2/f 57

Dear Sirs,

Despite your clear inscription, your message has been conveyed per surface mail, apparently per tramp clipper going the wrong way. It is possible that some controlling military mind somewhere feared that it might contain some damaging code. On the other hand, had it been sped more quickly, Slumtack might have gotten it before they went into liquidation, and so be lost to me now. As it is, your reference to your being manufacturers of brand-new HG Model Slammtraks is most interesting. That was a very fine, solid, basic unit, and they certainly don't make them here like that any more. In fact, the state of things here, there's a crying demand for the sturdy fundamental logic that such machines possess. Consequently I would like to place an order for 250 of the units, and would be pleased if you would advise me of what concessions obtain for those who buy in quantity, and the availability of spare parts, etc. . . . ■

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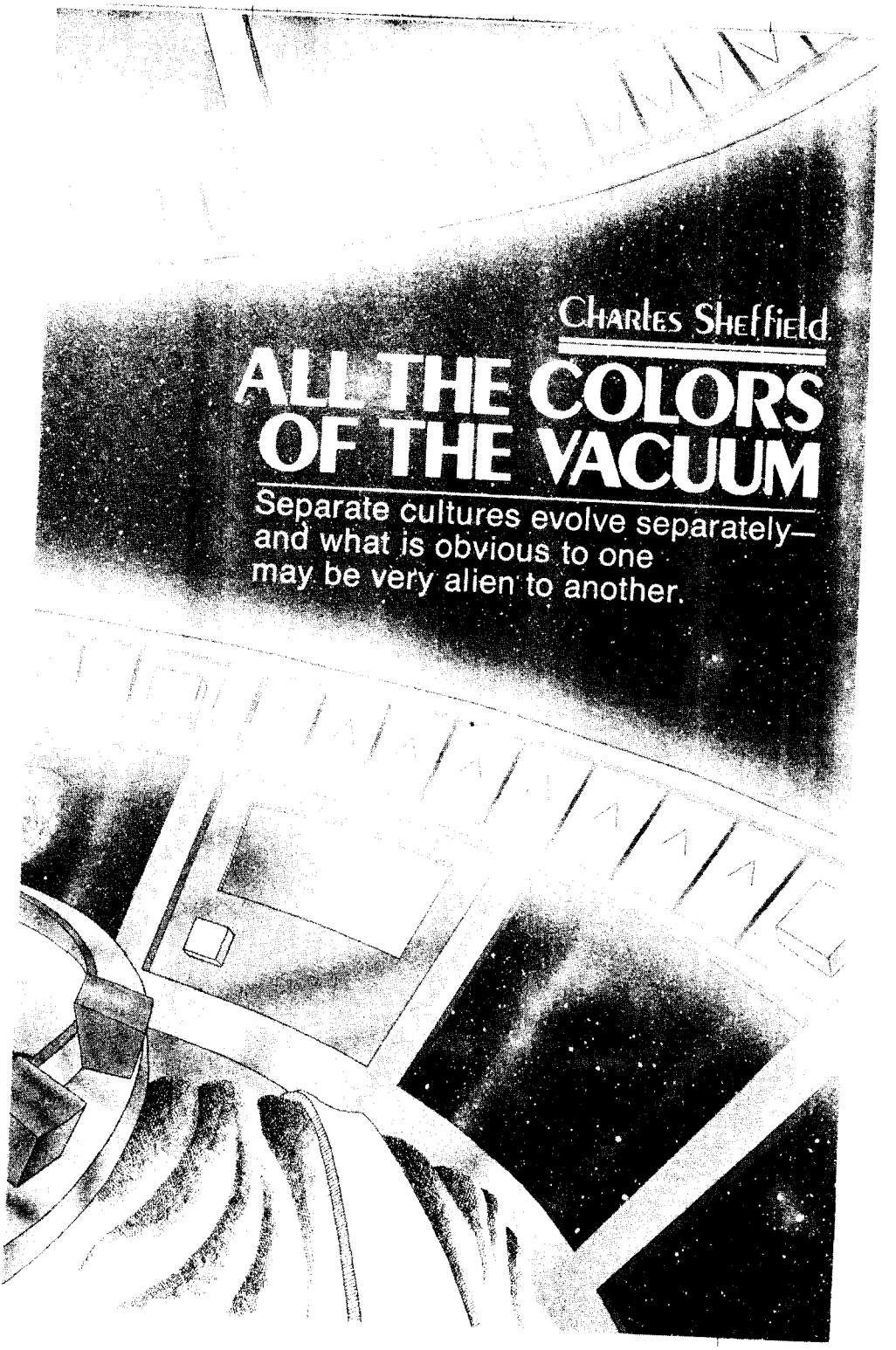
Charles Sheffield
ALL THE COLORS OF THE VACUUM
Separate cultures evolve separately—and what is obvious to one may be very alien to another.

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As soon as we got back from the mid-year run to Titan I went down to Earth and asked Wesley for a leave of absence. I had been working hard enough for six people and he knew it. He nodded agreeably as soon as I made the formal request.

"I think you've earned it, Captain Roker. But don't you have quite a bit of leave time saved up? Wouldn't that be enough?" He stopped staring out of the window at the orange-brown sky and called my records onto the screen in front of him.

"That won't do it," I said, while he was still looking.

Wesley frowned and became a little less formal. "It won't? Well, according to this, Jeanie, you've got at least . . ." He looked up. "Just how long *do* you want to take off?"

"I'm not exactly sure. Somewhere between nine and sixteen years."

I would have liked to break the news more gently, but maybe there was no graceful way.

It had begun, as many of the events in my life have begun, with McAndrew. He was best known—when he was known at all—as the mild-mannered, studious star of the Penrose Institute. To his colleagues he was the best combination of theorist and experimenter that physics had seen since Isaac Newton. And to me he was many things, but one of them was a man who could attract trouble and danger without lifting a finger.

I hadn't seen him in person since the first test of the McAndrew balanced drive, which the general public always referred to, to his huge irritation, as "McAndrew's inertialess drive." During that test I had extracted a promise from him that I would be on the first interstellar run. He had been full of drugs and painkillers when he agreed to it, but I wouldn't listen to that as an excuse. I called him as soon as I got back from the Titan run.

"Yes, she's ready enough to go." He had a strange expression on his face, somewhere between excitement and perplexity. "You've still got your mind set on going, then, Jeanie?"

I didn't even reply to that.

"How soon can I come out to the Institute?"

He cleared his throat, with the only legacy I had ever detected of his Scots ancestry. "Och, if you're set on it, come as soon as you please. I'll have things to tell you when you get here, but that can wait."

That was when I went down and made my request to Wesley for a long leave of absence. McAndrew had been strangely reluctant to discuss our destination, but I couldn't imagine that we'd be going out past Sirius. Alpha Centauri was my guess, and that would mean we would only be away about nine Earth years. Shipboard time would be three months, allowing a few days at the other end for exploration. If I knew McAndrew, he would have beaten the hundred gee acceleration that he projected for the interstellar prototype. He was never a man to talk big about what he was going to do.

The Penrose Institute had been moved out to Mars orbit since the last time I was there, so it took me a couple of weeks of impatient ship-hopping to get to it. When we finally closed to visible

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range I could see the old test ships, *Merganser* and *Dotterel*, floating a few kilometers from the main body of the Institute. They were easy to recognize from the flat mass disc with its protruding central spike. And floating near them, quite a bit bigger, was a new ship of gleaming silver. That had to be the *Hoatzin*, McAndrew's newest plaything. The disc was twice the size, and the spike three times as long, but *Hoatzin* was clearly *Merganser*'s big brother.

It was Professor Limperis, the head of the Institute, who greeted me when I entered. He was putting on weight, a middle-aged man with a guileless, coal-black face that hid a razor-sharp mind and a bottomless memory.

"Good to see you again, Captain Roker. I haven't told McAndrew this, but I'm very glad you'll be going along to keep an eye on him." He gave what he once described as his "hand-clapping Uncle Tom laugh"—a sure sign he was nervous about something.

"Well, I don't know that I'll be much use. I'm expecting to be just a sort of passenger. Don't worry. If my instincts are anything to go by there won't be much danger in a simple stellar rendezvous and return."

"Er, yes." He wouldn't meet my eye. "That was my own reaction. I gather that Professor McAndrew has not mentioned to you his change of target?"

"Change of target? He didn't mention any target at all." Now my own worry bead was beginning to throb. "Are you suggesting that the trip will *not* be a stellar rendezvous?"

He shrugged and waved his hands along the corridor. "Not if McAndrew gets his way. Come along, he's inside at the computer. I think it's best if he is present when we talk about this further."

Pure evasion. Whatever the bad news was, Limperis wanted me to hear it from McAndrew himself.

We found him staring vacantly at a completely blank display screen. Normally I would never interrupt him when he looks as imbecilic as that—it means that he is thinking with a breadth and depth that I'll never comprehend. I often wonder what it would be like to have a mind like that. Humans, with rare exceptions, must seem like trained apes, with muddied thoughts and no ability for abstract analysis.

Tough luck. It was time one of the trained apes had some of her worries put to rest. I walked up behind McAndrew and put my hands on his shoulders.

"Here I am. I'm ready to go—if you'll tell me where we're going."

He turned in his chair. After a moment his slack jaw firmed up and the eyes brought me into focus.

"Hello, Captain." No doubt about it, as soon as he recognized me he had that same shifty look I had noticed in Limperis. "I didn't expect you here so soon. We're still making up a flight profile."

"That's all right. I'll help you." I sat down opposite him, studying his face closely. As usual he looked tired, but that was normal. Geniuses work *harder* than anyone else, not less hard. His face was thinner, and he had lost a little more hair from that sandy, receding mop. My argument with him over that was long in the past.

"Why don't you grow it back? It's

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such a minor job, a couple of hours with the machines every few months and you'd have a full head of hair again."

He had sniffed. "Why don't you try and get me to grow a tail, or hair all over my body? Or maybe make my arms a bit longer, so they'll let me run along with them touching the ground? Jeanie, I'll not abuse a bio-feedback machine to run evolution in the wrong direction. We're getting less hairy all the time. I know your fondness for monkeys"—a nasty crack about an engineering friend of mine on Ceres, who was a bit hairy for even my accommodating tastes—"but I'll be just as happy when I have no hair at all. It gets in the way, it grows all the time, and it serves no purpose whatsoever."

McAndrew resented the time it took him to clip his fingernails, and I'm sure that he regarded his fondness for food as a shameful weakness. Meanwhile, I wondered who in the Penrose Institute cut his hair. Maybe they had a staff assistant, whose job it was to shear the absent-minded once a month.

"What destination are you planning for the first trip out?" If he was thinking of chasing a comet, I wanted that out in the open.

McAndrew looked at Limperis. Limperis looked at McAndrew, handing it back to him. Mac cleared his throat.

"We've discussed it here and we're all agreed. The first trip of the *Hoatzin* won't be to a star system." He cleared his throat again. "It will be to pursue and rendezvous with the Ark of Massingham. It's a shorter trip than any of the star systems," he added hopefully. He could read my expression. "They are less than two light years out. With the *Hoatzin* we can be there and docked with the Ark in less than thirty-five ship days."

If he was trying to make me feel better, McAndrew was going about it in quite the wrong way.

Back in the twenties, the resources of the Solar System must have seemed inexhaustible. No one had been able to *catalog* the planetoids, still less analyze their composition and probable value. Now we know everything out to Neptune that's bigger than a hundred meters across, and the navigation groups want that down to fifty meters in the next twenty years. The idea of grabbing an asteroid a couple of kilometers across and using it how you choose sounds like major theft. But it hadn't merely been permitted—it had been *encouraged*.

The first space colonies had been conceived as utopias, planned by Earth idealists who wouldn't learn from history. New frontiers may attract visionaries, but more than that they attract oddities. Anyone who is more than three sigma away from the norm, in any direction, seems to finish out there on the frontier. No surprise in that. If a person can't fit, for whatever reason, he'll move away from the main group of humanity. They'll push him, and he'll want to go. How do I know? Look, you don't pilot to Titan without learning a lot about your own personality. Before we found the right way to use people like me, I would probably have been on one of the Arks.

The United Space Federation had assisted in the launch of seventeen of them, between ninety and forty years ago. Each of them was self-supporting,

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a converted asteroid that would hold between three and ten thousand people at departure time. The idea was that there would be enough raw materials and space to let the Ark grow as the population grew. A two-kilometer asteroid holds five to twenty billion tons of matter. A total life-support system for one human needs less than ten tons of that.

The Arks had left long before the discovery of the McAndrew balanced drive, before the discovery of even the Mattin Drive. They were multi-generation ships, bumbling along into the interstellar void with speeds that were only a few percent of light speed.

And who was on board them when they left? Any fairly homogeneous group of strange people, who shared enough of a common philosophy or delusion to prefer the uncertainties of star travel to the known problems within the Solar System. It took courage to set out like that, to sever all your ties with home except occasional laser and radio communication. Courage, or an overpowering conviction that you were part of a unique and chosen group.

To put that another way, McAndrew was proposing to take us out to meet a community about which we knew little, except that by the usual standards they were descended from madmen.

"Mac, I don't remember which one was the Ark of Massingham. How long ago did it leave?"

Even mad people can have sane children. Four of the Arks, as I recalled, had turned around and were on their way back to the System.

"Seventy-five years ago. It's one of the earlier ones, with a final speed a bit less than three percent of light speed."

"Is it one of the Arks that has turned back?"

He shook his head. "No. They're still on their way. Target star is Tau Ceti. They won't get there for another three hundred years."

"Well, why pick them out? What's so special about the Ark of Massingham?" I had a sudden thought. "Are they having some problem that we could help with?"

We had saved two of the Arks in the past twenty years. For one of them we had been able to diagnose a recessive genetic element that was appearing in the children, and pass the test information and sperm filter technique over the communications link. The other had needed the use of an unmanned high-acceleration probe, to carry a couple of tons of cadmium out to them. They had been unlucky enough to choose a freak asteroid, one that apparently lacked the element even in the tiniest traces.

"They don't report any problem. We've never had a response to any messages we've sent to them, so far as the records on Oberon Station are concerned. But we know that they are doing all right, because about every three or four years a message has come in from them. Never anything about the Ark itself; it has always been scientific information."

McAndrew had hesitated as he said that last phrase. That was the lure, no doubt about it.

"What kind of information?" I said. "Surely we know everything that they know. We have hundreds of thousands of scientists in the System; they can't have more than a few hundred."

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"I'm sure you're right on the numbers." Professor Limperis spoke when McAndrew showed no inclination to do so. "I'm not sure it's relevant. How many scientists does it require to produce the work of one Einstein, or one McAndrew? You can't just sit down and count numbers, as though you were dealing with—with bars of soap, or with poker chips. You have to deal with individuals."

"There's a genius on the Ark of Massingham," said McAndrew suddenly. His eyes were gleaming. "A man or woman who has been cut off from most of physics for a whole lifetime, working alone. It's worse than Ramanujan."

"How do you know that?" I had seldom seen McAndrew so filled with feeling. "Maybe they've been getting messages from somebody in the System here."

McAndrew laughed, a humorless bark. "I'll tell you why, Jeanie Roker. You flew on *Merganser*. Tell me how the drive worked."

"Well, the mass plate at the front balanced the acceleration, so we didn't get any sensation of fifty gee." I shrugged. "I didn't work out the maths for myself, but I'm sure I could have if I felt like it."

I was, too. I have degrees in Electrical Engineering and in Gravitational Engineering. For my job I have to. I was a bit rusty, but you don't lose the basics once you have them planted deep enough in your head.

"I don't mean the balancing mechanism, that was just common sense." He shook his head. "I mean the *drive*. Didn't it occur to you that we were accelerating a mass of trillions of tons at fifty gee? If you work out the mass conversion rate that you will need with an ideal photon drive, you'll consume the whole mass in a few days. The *Merganser* got its drive by accelerating charged particles up to within millimeters a second of light speed, that was the reaction mass. But how did it get the energy to do it?"

I felt like telling him that when I had been on *Merganser* there had been other details—such as survival—on my mind. I thought for a few moments, then shook my head.

"You can't get more energy out of matter than the rest mass energy, I know that. But you're telling me that the drives on *Merganser* and *Hoatzin* do it. That Einstein was wrong."

"No, I'm not." McAndrew looked horrified at the thought that he might have been criticizing one of his senior idols. "All I've done is build on what Einstein did. Look, you've done some quantum mechanics, you must have. You know that when you calculate the energy for the vacuum state of a system you don't get zero. You get a positive value."

I had a hazy recollection of a formula swimming back across the years. What was it? ½hω, said a distant voice.

"But you can set that to zero!" I was proud at remembering so much. "The zero point of energy is arbitrary."

"In quantum theory it is. But not in general relativity." McAndrew was beating back my mental defenses. As usual when I spoke with him on theoretical subjects, I began to feel I would know less at the end of the conversation than I did at the beginning.

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"In general relativity," he went on. "Energy implies space-time curvature. If the zero point energy is not zero, the vacuum self-energy is real. It can be tapped, if you know what you are doing. That's where *Hoatzin* draws its energy. The reaction mass it needs is very small. You can get that by scooping up matter as you go along, or if you prefer it you can use a fraction—a very small fraction—of the mass plate."

"All right." I knew McAndrew. If I let him get going he would talk all day about physical principles. "But I don't see how that has anything to do with the Ark of Massingham. It has an old-fashioned drive, surely. You said it was launched seventy-five years ago."

"It was." This was Limperis again, gently insistent. "But you see, Captain Roker, nobody outside the Penrose Institute knows how Professor McAndrew has been able to tap the vacuum self-energy. We have been very careful not to broadcast that information until we were ready. The potential for destructive use is enormous. It destroys the old idea that you cannot create more energy at a point than the rest mass of the matter residing there. There was nothing known in the rest of the System about this use until two weeks ago."

"And then you released the information?" I was beginning to feel dizzy.

"No. The basic equations for accessing the vacuum self-energy were received by laser communication. They were sent, with no other message, *from the Ark of Massingham.*"

Suddenly it made sense. It wasn't just McAndrew who was itching to get in and find out what there was on the Ark—it was everyone at the Penrose Institute. I could sense the excitement in Limperis, and he was the most guarded and politically astute of all the Members. If some physicist, working out there alone two light-years from Sol, had managed to parallel McAndrew's development, that was a momentous event. It implied a level of genius that was difficult to imagine.

I knew *Hoatzin* would be on the way in a few days, whether I wanted to go or stay. But there was one more key question.

"I can't believe that the Ark of Massingham was started by a bunch of physicists. What was the original composition of the group that colonized it?"

"Not physicists." Limperis had suddenly sobered. "By no means physicists. That is why I am glad you will be accompanying Professor McAndrew. The leader of the original group was Jules Massingham. In the past few days I have taken the time to obtain all the System records on him. He was a man of great personal drive and convictions. His ambition was to apply the old principles of eugenics to a whole society. Two themes run through all his writings: the creation of the superior human, and the idea of that superior being as an integrated part of a whole society. He was ruthless in his pursuit of those ends."

He looked at me, black face impassive. "From the evidence available, Captain, one might suggest that he succeeded in his aims."

Hoatzin was a step up from *Merganser* and *Dotterel*. Maximum acceleration was a hundred and ten gee, and the

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living capsule was a four-meter sphere. I had cursed the staff of the Institute, publicly and privately, but I had got nowhere. They were obsessed with the idea of the lonely genius out there in the void, and no one would consider any other first trip for *Hoatzin*. So at least I would check out every aspect of the system before we went, while McAndrew was looking at the rendezvous problem and making a final flight plan. We sent a message to the Ark, telling them of our trip and estimated arrival time. It would take two years to get there, Earth-time, but we would take even longer. They would be able to prepare for our arrival however they chose, with garlands or gallows.

On the trip out, McAndrew tried again to explain to me his methods for tapping the vacuum self-energy. The available energies made up a quasi-continuous "spectrum", corresponding to a large number of very high frequencies of vibration and associated wavelengths. Tuned resonators in the *Hoatzin* drive units selected certain wavelengths which were excited by the corresponding components in the vacuum self energy. These "colors," as McAndrew thought of them, could feed vacuum energy to the drive system. The results that had come from the Ark of Massingham suggested that McAndrew's system for energy extraction could be generalized, so that all the "colors" of the vacuum self-energy should become available. If that was true, the potential acceleration produced by the drive would go up by a couple of orders of magnitude. He was still working out what the consequences of that would be. At speeds that approached within a nanometer per second of light speed, a single proton would mass enough to weigh its impact on a sensitive balance.

I let him babble on to his heart's content. My own attention was mostly on the history of the Ark of Massingham. It was an oddity among oddities. Six of the Arks had disappeared without trace. They didn't respond to signals from Earth, and they didn't send signals of their own. Most people assumed that they had wiped themselves out, with accidents, wars, strange sexual practices, or all three. Four of the Arks had swung back towards normalcy and were heading in again for the System. Six were still heading out, but two of them were in deep trouble if the messages that came back to Oberon Station were any guide. One was full of messianic ranting, a crusade of human folly propagating itself out to the stars (let's hope they never met anyone out there whose good opinion we would later desire). The other was quietly and peacefully insane, sending messages that spoke only of new rules for the interpretation of dreams. They were convinced that they would find the world of the Norse legends when they finally arrived at Eta Cassiopeia, complete with Jotunheim, Nitlheim, and all the assembly of gods and heroes. It would be six hundred years before they arrived there, time enough for moves to rationality or to extinction.

Among this set, the Ark of Massingham provided a bright mixture of sanity and strangeness. They had sent messages back since first they left, messages that assumed the Ark was the carrier of human hopes and a superior

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civilization. Nothing that we sent—questions, comments, information, or acknowledgements—ever stimulated a reply. And nothing that *they* sent ever discussed life aboard the Ark. We had no idea if they lived in poverty or plenty, if they were increasing or decreasing in numbers, if they were receiving our transmissions, if they had material problems of any kind. Everything that came back to the System was science, delivered in a smug and self-satisfied tone. From all that science, the recent transmission on physics was the only one to excite more than a mild curiosity from System scientists. Usually the Ark sent "discoveries" that had been made here long ago.

Once the drive of the *Hoatzin* was up to full thrust there was no way that we could see anything or communicate with anyone. The drive was fixed to the mass plate on the front of the ship, and the particles that streamed past us and out to the rear were visible only when they were in collision with the rare atoms of hydrogen drifting in free space. We had actually settled for less than a maximum drive and were using a slightly dispersed exhaust. A tightly focused and collimated beam wouldn't harm us any, but we didn't want to generate a death ray behind us that would disintegrate anything in its path for a few light years.

Six days into the trip, our journey out shared the most common feature of all long distance travel. It was boring. When McAndrew wasn't busy inside his head, staring at the wall in front of him and performing the mental acrobatics that he called theoretical physics, we talked, played and exercised. I was astonished again that a man who knew so much about so much could know nothing about some things.

"You mean to tell me," he said once, as we lay in companionable darkness, with the side port showing the eldritch and unpredictable blue sparks of atomic collision. "You mean that *Lungfish* wasn't the first space station? All the books and records show it that way."

"No, they don't. If they do, they're wrong. It's a common mistake. Like the idea back at the beginning of flight itself, that Lindbergh was the first man to fly across the Atlantic Ocean. He was more like the hundredth." I felt McAndrew turn his head towards me. "Yes, you heard me. A couple of airships had been over before him, and a couple of other people in aircraft. He was just the first person to fly *alone*. *Lungfish* was the first *permanent* space station, that's all. And I'll tell you something else. Did you know that in the early flights, even ones that lasted for months, the crews were usually all men? Think of that for a while."

He was silent for a moment. "I don't see anything wrong with it. It would simplify some of the plumbing, maybe some other things, too."

"You don't understand, Mac. That was at a time when it was regarded as morally wrong for men to form relationships with men, or women with women."

There was what I might describe as a startled silence.

"Oh," said McAndrew at last. Then, after a few moments more, "My God. How much did they have to pay them? Or was coercion used?"

"It was considered an honor to be chosen."

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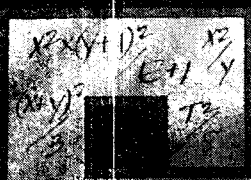
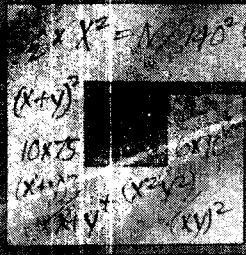


He didn't say any more about it; but I don't think he believed me, either. Weirdness is one of the first things you learn on long trips.

We cut off the drive briefly at crossover, but there was nothing to be seen and there was still no way we could receive messages. Our speed was crowding light speed so closely that anything from Oberon Station would scarcely be catching up with us. The Institute's message was still on its way to the Ark of Massingham, and we would be there ourselves not long after it. The *Hoatzin* was behaving perfectly, with none of the problems that had almost done us in on the earlier test ships. The massive disc of dense matter at the front of the ship protected us from most of our collisions with stray dust and free hydrogen. If we didn't come back, the next ship out could follow our path exactly, tracking our swath of ionization.



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During deceleration I began to search the sky beyond the *Hoatzin* every day, with an all-frequency sweep that ought to pick up signals as soon as our drive went to reduced thrust. We didn't pick up the Ark until the final day and it was no more than a point on the microwave screen for most of that. The image we finally built up on the monitor showed a lumpy, uneven ball, pierced by black shafts. Spiky antennas and angled gantries stood up like spines on its dull grey surface. I had seen the images of the Ark before it left the System, and all the surface structures were new. The colonists had been busy in the seventy-seven years since they accelerated away from Ganymede orbit.

We moved in to five thousand kilometers, cut all drive, and sent a calling sequence. I don't remember a longer five seconds, waiting for their response. When it came it was an anti-climax. A pleasant-looking middle-aged woman appeared on our screen.

"Hello," she said cheerfully. "We received a message that you were on your way here. My name is Kleeman. Link in your computer and we'll dock you. There will be a few formalities before you can come inside."

I put the central computer into distributed mode and linked a navigation module through the comnet. She sounded friendly and normal but I didn't want her to have override control of all the *Hoatzin*'s movements. We moved to a position about fifty kilometers away from the Ark, then Kleeman appeared again on the screen.

"I didn't realize your ship had so much mass. We'll hold there, and you can come on in with a pod. All right?"

We called it a capsule these days, but I knew what she meant. I made McAndrew put on a suit, to his disgust, and we entered the small transfer vessel. It was just big enough for three people, with no air lock and a simple electric drive. We drifted in to the Ark, with the capsule's computer slaved through the *Hoatzin*. As we got nearer I had a better feel for size. Two kilometers is small for an asteroid, but it's awfully big compared with a human. We nosed in to contact with a landing tower, like a fly landing on the side of a wasp's nest. I hoped that would prove to be a poor simile.

We left the capsule open and went hand-over-hand down the landing tower rather than wait for an electric lift. It was impossible to believe that we were moving at almost nine thousand kilometers a second away from Earth. The stars were in the same familiar constellations, and it took a while to pick out the Sun. It was a bright star, but a good deal less bright than Sirius. I stood at the bottom of the tower for a few seconds, peering about me before entering the air lock that led to the interior of the Ark. It was like a strange, alien landscape, with the few surface lights throwing black angular shadows across the uneven rock. My trips to Titan suddenly felt like local hops around the comfortable backyard of the Solar System.

"Come on, Captain." That was McAndrew, all brisk efficiency and already standing in the air lock. He was much keener than I to penetrate that unfamiliar world of the interior.

I took a last look at the stars, and

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fixed in my mind the position of the transfer capsule—an old habit that pays off once in a thousand times. Then I followed McAndrew down into the lock.

"A few formalities before you can come inside." Kleeman had a gift for understatement. We found out what she meant when we stepped in through the inner lock, to an office-cum-schoolroom equipped with a couple of impressive consoles and displays. Kleeman met us there, as pleasant and rosy-faced in the flesh as she had seemed over the comlink.

She waved us to the terminals. "This is an improved version of the equipment that was on the original ship, before it left your System. Please sit down. Before anyone can enter our main Home, they must take tests. It has been that way since Massingham first showed us how our society could be built."

We sat at the terminals, back-to-back. McAndrew was frowning at the delay. "What's the test, then?" he grumbled.

"Just watch the screen. I don't think that either of you will have any trouble." She smiled and left us to it. I wondered what the penalty was if you failed. We were a long way from home. It seemed clear that if they had been improving this equipment after they left Ganymede, they must apply it to their own people. We were certainly the first visitors they had seen for seventy-five years. How had they been able to accept our arrival so calmly?

Before I could pursue that thought the screen was alive. I read the instructions as they appeared there, and followed them as carefully as possible. After a few minutes I got the knack of it. We had tests rather like it when I first applied to go into space. To say that we were taking an intelligence test would be an oversimplification—many other aptitudes were tested, as well as knowledge and mechanical skills. That was the only consolation I had. McAndrew must be wiping the floor with me on all the parts that called for straight brainpower, but I knew that his coordination was terrible. He could unwrap a set of interlocking multiply-connected figures mentally and tell you how they came apart, but ask him to do the same thing with real objects and he wouldn't be able to start.

After three hours we were finished. Both screens suddenly went blank. We swung to face each other.

"What's next?" I said. He shrugged and began to look at the terminal itself. The design hadn't been used in the System for fifty years. I took a quick float around the walls—we had entered the Ark near a pole, where the effective gravity caused by its rotation was negligible. Even on the Ark's equator I estimated that we wouldn't feel more than a tenth of a gee, at the most.

No signs of what I was looking for, but that didn't mean much. Microphones could be disguised in a hundred ways.

"Mac, who do you think *she* is?"

He looked up from the terminal. "Why, she's the woman assigned to . . ." He stopped. He had caught my point. When you are two light years from Sol and you have your first visitors for seventy-five years, who leads the reception party? Not the man and woman

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who recycle the garbage. Kleeman ought to be somebody important on the Ark.

"I can assist your speculation," said a voice from the wall. So much for our privacy. As I expected, we had been observed throughout—no honor system on this test. "I am Kal Massingham Kleeman, the daughter of Jules Massingham, and I am senior member of Home outside the Council of Intellects. Wait there for one more moment. I will join you with good news."

She was beaming when she reappeared. Whatever they were going to do with us, it didn't seem likely they would be flinging us out into the void.

"You are both prime stock, genetically and individually," she said. "I thought that would be the case when first I saw you."

She looked down at a green card in her hand. "I notice that you both failed to answer one small part of the inquiry on your background. Captain Roker, your medical record indicates that you bore one child. But what is its sex, condition, and present status?"

I heard McAndrew suck in his breath past his teeth, while I suppressed my own shock as best I could. It was clear that the standards of privacy in the System and on the Ark had diverged widely in the past seventy-seven years.

"It is a female." I hope I kept my voice steady. "Healthy, and with no neuroses. She is in first-level education on Luna."

"The father?"

"Unknown."

I shouldn't have been pleased to see that now Kleeman was shocked, but I was. She looked as distressed as I felt. After a few seconds she grabbed control of her emotions, swallowed, and nodded.

"We are not ignorant of the unplanned matings that your System permits. But hearing of such things and encountering them directly are different things." She looked again at her green card. "McAndrew, you show no children. Is that true?"

He had taken his lead from me and managed a calm reply. "No known children."

"Incredible." Kleeman was shaking her head. "That a man of your talents should be permitted to go so long without suitable mating . . ."

She looked at him hungrily, the way that I have seen McAndrew eye an untapped set of experimental data from out in the Halo. I could imagine how he had performed on the intellectual sections of the test.

"Come along," she said at last, still eyeing McAndrew in a curiously intense and possessive way. "I would like to show you some of Home, and arrange for you to have living quarters for your use."

"Don't you want more details of *why* we are here?" burst out Mac. "We've come nearly two light years to get to the Ark."

"You have been receiving our messages of the advances that we have made?" Kleeman's manner had a vast self-confidence. "So why should we be surprised when superior men and women from your system wish to come here? We are only surprised that it took you so long to develop a suitably efficient ship. Your vessel is new?"

"Very new." I spoke before Mc-

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Andrew could get a word in. Kleeman's assumption that we were on the Ark to stay had ominous overtones. We needed to know more about the way the place functioned before we told her that we were planning only a brief visit.

"We have been developing the drive for our ship using results that parallel some of those found by your scientists," I went on. I gave Mac a look that kept him quiet for a little while longer. "When we have finished with the entry preliminaries, Professor McAndrew would very much like to meet your physicists."

She smiled serenely at him. "Of course. McAndrew, you should be part of our Council of Intellects. I do not know just how high your position was back in your system, but I feel sure you have nothing as exalted—and as respected—as our Council. Well"—she placed the two green cards she was holding in the pocket of her yellow smock—"there will be plenty of time to discuss induction to the Council when you have settled in here. The entry formalities are complete. Let me show you Home. There has never been anything like it in the whole of human history."

Over the next four hours we followed Kleeman obediently through the interior of the Ark. McAndrew was itching to locate his fellow-physicists, but he knew he was at the mercy of Kleeman's decisions. From our first meeting with others on the Ark, there was no doubt who was the boss there.

How can I describe the interior of the Ark? Imagine a free-space bee-hive, full of hard-working bees that had retained an element of independence of action. Everyone on the Ark of Massingham seemed industrious, cooperative, and intelligent. But they were missing a dimension, the touch of orneriness and unpredictability that you would find on Luna or on Titan. Nobody was cursing, nobody was irrational. Kleeman guided us through a clean, slightly dull Utopia.

The technology of the Ark was simpler to evaluate. Despite the immense pride with which Kleeman showed off every item of development, they were half a century behind us. The sprawling, overcrowded chaos of Earth was hard to live with, but it provided a constant pressure towards innovation. New inventions come fast when ten billion people are there to push you to new ideas. In those terms, life on the Ark was spacious and leisurely. The colony had constructed its network of interlocking tunnels to a point where it would take months to explore all the passages and corridors, but they were nowhere near exhausting their available space and resources.

"How many people would the Ark hold?" I asked McAndrew as we trailed along behind Kleeman. It would have taken only a few seconds to work it out for myself, but you get lazy when you live for a while with a born calculator.

"If they don't use the interior material to extend the surface of the Ark?" he said. "Give them the same room as we'd allow on Earth, six meters by six meters by two meters. They could hold nearly sixty million. Halve that, maybe, to allow for recycling and maintenance equipment."

"But that is not our aim," said Kleeman. She had overheard my question. "We are stabilized at ten thousand. We

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are not like the fools back on Earth. *Quality* is our aim, not mindless numbers."

She had that tone in her voice again, the one that had made me instinctively avoid the question of how long we would be staying on the Ark. Heredity is a potent influence. I couldn't speak about Jules Massingham, the founder of this Ark, but his daughter was a fanatic. I have seen others like her over the years. Nothing would be allowed to interfere with the prime objective: build the Ark's population on sound eugenic principles. Kleeman was polite to me—I was "prime stock"—but she had her eye mainly on McAndrew. He would be a wonderful addition to her available gene pool.

Well, the lady had taste. I shared some of that attitude myself. "Father unknown" was literally true and Mac and I had not chosen to elaborate. My daughter had rights, too, and her parentage would not be officially known unless she chose at puberty to take the chromosome matching tests.

Over the next six days, McAndrew and I worked our way into the life pattern aboard the Ark. The place ran like a clock, everything according to a schedule and everything in the right position. I had a good deal of leisure time, which I used to explore the less-popular corridors, up near the Hub. McAndrew was still obsessed with his search for physicists.

"No sense here," he growled to me, after a meal in the central dining-area, out on the Ark's equator. As I had guessed, effective gravity there was about a tenth of a gee. "I've spoken to a couple of dozen of their scientists. There's not a one of them would last a week at the Institute. Muddled minds and bad experiments."

He was angry. Usually McAndrew was polite to all scientists, even ones who couldn't understand what he was doing, still less add to it.

"Have you seen them all? Maybe Kleeman is keeping some of them from us."

"I've had that thought. She's talked to me every day about the Council of Intellects, and I've seen some of the things they've produced. But I've yet to meet one of them, in person." He shrugged, and rubbed at his sandy, receding hairline. "After we've slept I'm going to try another tack. There's a schoolroom over on the other side of the Ark, where I gather Kleeman keeps people who don't seem quite to fit into her ideas. Want to take a look there with me, tomorrow?"

"Maybe. I'm wondering what Kleeman has in mind for *me*. I think I know her plans for you; she sees you as another of her senior brains." I saw the woman herself approaching us across the wide room, with its gently curving floor. "You'd like it, I suspect. It seems to be like the Institute, but members of the Council have a lot more prestige."

I had immediate proof that I was right. Kleeman seemed to have made up her mind. "We need a commitment from you, McAndrew," she said. "There will soon be a vacancy on the Council. You are the best person to fill it."

McAndrew looked flattered but uncomfortable. The trouble was, it really *did* interest him, I could tell that. The idea of a top-level brains trust had appeal.

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"All right," he said after a few moments. He looked at me, and I could tell what he was thinking. If we were going to be on our way back home soon, it would do no harm to help the Ark while he was here. They could use all the help available.

Kleeman clapped her hands together softly, plump white hands that pointed out her high position—most people on the Ark had manual duties to keep the place running, with strict duty rosters.

"Wonderful! I will plan for your induction tomorrow. Let me make the announcement tonight, and we can speed up the proceedings for the outgoing member."

"You always have a fixed number of members?" asked McAndrew.

She seemed slightly puzzled by his question. "Of course. Exactly twelve. The system was designed for that number."

She nodded at me and hurried away across the dining area, a determined little woman who always got her way. Since we first arrived, she had never ceased to tell McAndrew that he must become the father of many children, scores of children, hundreds of children. He looked more and more worried as she increased the suggested number of his future progeny.

The next morning I went on with my own exploration of the Ark, while McAndrew made a visit to the Ark's oddities, the people who didn't seem to fit Kleeman's expectations. We met to eat together, as usual, and I had a lot on my mind. I had come across an area in the center of the Ark where power supply lines and general purpose tube inputs increased enormously, but it did not seem to be a living area. Everything led to one central area, and that was accessible only with a suitable code. I puzzled over it while I waited for McAndrew to appear.

The whole Ark was bustling with excitement. Kleeman had made the announcement of McAndrew's incorporation to the Council of Intellects. People who had scarcely spoken to him before stopped us and shook his hand solemnly, wishing him well and thanking him for his devotion to the welfare of the Ark. While I drank an aperitif of glucose and dilute ascorbic acid, preparations for a big ceremony were going on around me. A new Council member was a big event.

When I saw McAndrew threading his way towards me past a network of new scaffolding, I knew his morning had been more successful than mine. His thin face was flushed with excitement and pleasure. He slid into the seat opposite me.

"You found your physicist?" I hardly needed to ask the question.

He nodded. "Up on the other side, in a maximum gravity segment directly—right across from here. He's—you have no idea—he's—" McAndrew was practically spluttering in his excitement.

"Start from the beginning." I leaned across and took his hands in mine.

"Yes. I went out on the other side of the Ark, where there's a sort of tower built out from the surface. We must have passed it on the way over from the *Hoatzin* but I didn't notice it then. Kleeman never took us there—never mentioned it to me."

He reached out with one hand across

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the table, grabbed my drink and took a great gulp of it. "Och, Jeanie, I needed that. I've not stopped since I first opened my eyes. Where was I? I went on up to that tower, and there was nobody to stop me or to say a word. And I went on inside, further out, to the very end of it. The last segment has a window all the way round it, so when you're there you can see the stars and the nebulae wheeling round past your head."

McAndrew was unusually stirred and his last sentence proved it. The stars were normally considered fit subjects only for theory and computation.

"He was out in that last room," he went on. "After I'd given up hope of finding anybody in this whole place who could have derived those results we got back through Oberon Station. Jeanie, he looks no more than a boy. So blond, and so young. I couldn't believe that he was the one who worked out that theory. But he is. We sat right down at the terminal there, and I started to run over the background for the way that I renormalize the vacuum self-energy. It's nothing like his way. He has a completely different approach, different invariants, different quantization conditions. I think his method is a good deal more easy to generalize. That's why he can get multiple vacuum colors out when we look for resonance conditions. Jeanie, you should have seen his face when I told him that we probably had fifty people at the Institute who would be able to follow his proofs. He's been completely alone here. There's not another one who can even get close to following him, he says. When he sent back those equations, he didn't tell people how important he thought they might be. He says they worry most about the control on what comes in from the System, rather than what goes out from here. I'm awful glad we came here. God, he's an accident, a sport that shows up only once in a couple of centuries—and he was born out here in the void! Did you know, he's taken all the old path integral methods, and he has a form of quantum theory that looks so simple, you'd never believe it if you didn't see it . . ."

He was off again. I had to break in, or he would have talked without stopping, right through our meal. McAndrew doesn't babble often, but when he does he's hard to stop.

"Mac, hold on. Something here doesn't make sense. What about the Council of Intellects?"

"What about it?" He looked as though he had no possible interest in the Council of Intellects—even though the bustle that was going on all around us, with new structures being erected, was all to mark McAndrew's elevation to the Council.

"Look, just yesterday we agreed that the work you're interested in here must have originated with the Council. You told me you hadn't met one person who knew anything worth discussing. Are you telling me now that this work on the vacuum energy *doesn't* come from the people on the Council?"

"I'm sure it doesn't. I doubted that even before I met Wicklund, up there in the tower." McAndrew was looking at me impatiently. "Captain, if that's the impression I gave, it's not what I meant. A thing like this is almost always the work of a single person. It's not

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initiated by a group, even though a group may help to apply it to practice. This work, the vacuum color work, that's *all* Wicklund—the Council knows nothing of it."

"So what *does* the Council do? I hope you haven't forgotten that you're going to join it later today. I don't think Kleeman would take it well if you said you wanted to change your mind."

He waved an impatient arm at me. "Now, Jeanie, you know I've no time for that. The Council of Intellects is some sort of guiding and advising group, and I'm willing to serve on it and do what I can for the Ark. But not now. I have to get back over to Wicklund and sort out some of the real details. Did I mention that I've explained all about the drive to him? He mops up new material like a sponge. If we can get him back to the Institute he'll catch up on fifty years of System science development in a few months. You know, I'd better go and talk to Kleeman about this Council of hers. What's the use of calling it a Council of Intellects, when people like Wicklund are not on it? And I'll have to tell her we want to take him back with us. I've already mentioned it to him. He's interested, but he's a bit scared of the idea. This is home to him, the only place he knows. Here, is that Kleeman over there by the scaffolding? I'd better catch her now."

He was up and out of his seat before I could stop him. He hurried over to her, took her to one side and began to speak to her urgently. He was gesturing and cracking his finger joints, in the way that he always did when he was wound up on something. As I moved to join them I could see Kleeman's expression changing from a friendly interest to a solid determination.

"We can't change things now, McAndrew," she was saying. "The departing member has already been removed from the Council. It is now imperative that the replacement be installed as soon as possible. That ceremony must take place tonight."

"But I want to continue my meetings with—"

"The ceremony will take place tonight. Don't you understand? The Council cannot function unless there are all twelve members meeting. I cannot discuss this further. There is nothing to discuss."

She turned and walked away. Just as well. McAndrew was all set to tell her that he was not about to join her precious Council, and he was planning to leave the Ark without fathering hundreds, scores, or even ones of children. And he was taking one of her colonists—her subjects—with him. I took his arm firmly and dragged him back to our table.

"Calm down, Mac." I spoke as urgently as I could. "Don't fly off wild now. Let's get this stupid Council initiation rite out of the way today, and then let's wait a while and approach Kleeman on all this when she's in a more reasonable mood. All right?"

"That damned, obstinate, overbearing woman. Who the hell does she think she is?"

"She thinks she's the boss of the Ark of Massingham, and she *is* the boss of the Ark of Massingham. Face facts. Slow down now, and go back to Wicklund. See if he's interested in leaving when we leave, but don't push it too

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hard. Let's wait a few days; there's nothing to be lost from that."

How naive can you get? Kleeman had told us exactly what was going on, but we hadn't listened. People hear what they expect to hear.

I found out the truth the idiot's way. After McAndrew had gone off again, calm enough to talk to his new protege, I had about four hours to kill. The great ceremony in which McAndrew would become part of the Council of Intellects would not take place until after the next meal. I decided I would have another look at the closed room that I had seen on my earlier roaming.

The room was still locked, but this time there was a servicewoman working on the pipes that led into it. She recognized me as one of the two recent arrivals on the Ark—the less important one, according to Ark standards.

"Tonight's the big event," she said to me, her manner friendly. "You've come to take a look at the place your friend will be, have you? You know, we really need him. The Council has been almost useless for the past two years, with one Member almost gone. Kleeman knew that, but she didn't seem happy to provide a new Member until she met McAndrew."

She obviously assumed I knew all about the Council and its workings. I stepped closer, keeping my voice casual and companionable. "I'll see all this for myself tonight. McAndrew will be in here, right? I wonder if I could take a peek now, I've never been inside before."

"Sure." She went to the door and keyed in a combination. "There's been talk for a while now of moving the Council to another part of Home, where there's less vibration from construction work. No sign of it happening yet, though. Here we go. You won't be able to go inside the inner room, of course, but you'll find you can see most things from the service area."

As the door slid open I stepped through into a long, brightly-lit room. It was empty.

My heart began to pound urgently and my mouth was as dry as Ceres. Strange, how the *absence* of something can produce such a powerful effect on the body.

"Where are they?" I said at last. "The Council. You said they are in this room."

She looked at me in comical disbelief. "Well, you didn't expect to find them out *here*, did you? Take a look through the hatch at the end there."

We walked forward together and peered through a transparent panel at the far end of the room. It led through to another, smaller chamber, this one dimly lit by a soft green glow.

My eyes took a few seconds to adapt. The big, translucent tank in the center of the room slowly came into definition. All around it, equally spaced, were twelve smaller sections, all inter-connected through a massive set of branching cables and optic bundles.

"Well, there they are," said the servicewoman. "Doesn't look right, does it, with one of them missing like this? It doesn't work, either. The information linkages are all built for a set of exactly twelve units, with a twelve-by-twelve transfer matrix."

Now I could see that one of the small

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tanks was empty. In each of the eleven others, coupled to a set of thin plastic tubes and contact wires, was a complex shape, a dark-grey ovoid swimming in a bath of green fluid. The surfaces were folded and convoluted, glistening with the sticky sheen of animal tissues. At the lower end, each human brain thinned away past the brain stem to the spinal chord.

I remember asking her just one question.

"What would happen if the twelfth Member of the Council of Intellects were not connected in today?"

"It would be bad." She looked shocked. "Very bad. I don't know the details, but I think all the potentials would run wild in a day or two, and destroy the other eleven. It has never happened. There have always been twelve members of the Council, since Massingham created it. He is the one over there, on the far right."

We must have spoken further, but already my mind was winging its way back to the dining area. I was to meet McAndrew one hour before the big ceremony. "Incorporation," that was what Kleeman had called it, incorporation into the Council. De-corporation would be a better name for the process. But the Council of Intellects was well-named. After someone has been pared down, flesh, bone and organs, to a brain and a spinal column, intellect is all that can remain. Perhaps the thing that had upset me more than anything in that inner room had been their decision to leave the eyes intact. They were there, attached to each brain by the protruding stalks of their optic nerves. They looked like the horns of a snail, blue, grey or brown balls projecting from the frontal lobes. Since there were no muscles left to change the focal length of the eye lenses, they were directed to display screens set at fixed distances from the tanks.

The wait in the dining area was a terrible period. I had been all right on the way back from the Council Chamber, there had been movement to make the tension tolerable, but when McAndrew finally appeared my nerves had become awfully ragged. He was all set to burble on about his physics discussions. I cut him off before he could get out one word.

"Mac, don't speak and don't make any quick move. We have to leave the Ark. Now."

"Jeanie!" Then he saw my face. "What about Wicklund? We've talked again and he wants to go with us—but he's not ready."

I shook my head and looked down at the table top. It was the worst possible complication. We had to move through the Ark and transfer across to the *Hoatzin*, without being noticed. If Kleeman sensed our intentions, Mac might still make it to the Council. My fate was less certain but probably even worse—if a worse fate is imaginable. It would be hard enough doing what we had to do without the addition of a nervous and inexperienced young physicist. But I knew McAndrew.

"Go get him," I said at last. "Remember the lock we came in by?"

He nodded. "I can get us there. When?"

"Half an hour. Don't let him bring anything with him—we'll be working with a narrow margin."

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He stood up and walked away without another word. So he probably wouldn't have agreed to go without Wicklund; but he hadn't asked me for any explanation, hadn't insisted on a reason why we had to leave. That sort of trust isn't built up overnight. I was scared shitless as I stood up and left the dining area, but in an obscure way I was feeling that warm glow you only feel when two people touch deeply. McAndrew had sensed a life-or-death issue.

Back at our sleeping quarters I picked up the comlink that gave me coded access to the computer on the *Hoatzin*. We had to make sure the ship was still in the same position. I followed my own directive and took nothing else. Kal Massingham Kleeman was a lady whose anger was best experienced from a distance—I had in mind a light-year or two. I was only concerned now with the first couple of kilometers of that. We might find it necessary to move out of the Ark in a hurry.

The interior of the Ark was a great warren of connecting tunnels, so there were a hundred ways between any two points. That was just as well. I changed my path whenever I saw anyone else approaching, but I was still able to move steadily in the direction of our entry lock.

Twenty minutes since McAndrew had left. Now the speaker system crackled and came to life.

"Everyone will assemble in Main Hall Five."

The ceremony was ready to begin. Kleeman was going to produce Hamlet without the Prince. I stepped up my pace. The trip through the interior of the Ark was taking longer than I expected, and I was going to be late.

Thirty minutes, and I was still one corridor away. The monitors in the passage ceiling suddenly came to life, their red lenses glowing. All I could do was keep moving. There was no way of avoiding those monitors, they extended through the whole interior of the Ark.

"McAndrew and Roker." It was Kleeman's voice, calm and superior. "We are waiting for you. There will be punishment unless you come here at once to Main Hall Five. Your presence in the outer section has been noted. A collection detail will arrive there any moment now. McAndrew, do not forget that the Council awaits you. You are abusing a great honor by your actions."

I was at last at the lock. McAndrew stood there listening to Kleeman's voice. The young man by his side—as Mac had said, so blond, so young—had to be Wicklund. Behind those soft blue eyes lay a brain that even McAndrew found impressive. Wicklund was frowning now, his expression indecisive. All his ideas on life had been turned upside down in the past days, and now Kleeman's words must be giving him second thoughts about our escape.

Without speaking, McAndrew turned and pointed towards the wall of the lock. I looked, and felt a sudden sickness. The wall where the line of suits should be hanging was empty.

"No suits?" I said stupidly.

He nodded. "Kleeman has been thinking a move ahead of you."

"You know what joining the Council would imply?"

He nodded again. His face was grey.

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"Wicklund told me as we came over here. I couldn't believe it at first. I asked him, what about the children Kleeman wanted me to sire? They would drain me for the sperm bank before they . . ." He swallowed. There was a long and terrible pause. "I looked out," he said at last. "Through the viewport there. The capsule is still where we left it."

"You're willing to chance it?" I looked at Wicklund, who stood there not following our conversation at all.

"I am." Mac nodded. "But what about him? There's no Sturm Invocation for people here on the Ark."

As I had feared, Wicklund was a major complication. I walked forward and stood in front of him. "Do you still want to go with us?"

He licked his lips, then nodded.

"Into the lock." We moved forward together and I closed the inner door.

"Do not be foolish." It was Kleeman's voice again, this time with a new expression of alarm. "There is nothing to be served by sacrificing yourselves to space. McAndrew, you are a rational man. Come back, and we will discuss this together. Do not waste your potential by a pointless death."

I took a quick look through the port of the outer lock. The capsule was there all right, it looked just the same as when we left it. Wicklund was staring out in horror. Until Kleeman had spoken, it did not seem to have occurred to him that we were facing death in the void.

"Mac!" I said urgently.

He nodded, and gently took Wicklund by the shoulders, swinging him around to face him. I stepped up behind him and dug hard into the nerve centers at the base of his neck. He was unconscious in two seconds.

"Ready, Mac?"

Another quick nod. I checked that Wicklund's eyelids were closed, and that his breathing was shallow. He would be unconscious for another couple of minutes, pulse rate low and oxygen need reduced.

McAndrew stood at the outer lock, ready to open it. I pulled the whistle from the lapel of my jacket and blew hard. The varying triple tone sounded through the lock. Penalty for improper use of any Sturm Invocation was severe, whether you used spoken, whistled, or electronic methods. I had never used it before.

Anyone who goes into space, even if it is just a short trip from Earth to Moon, must receive Sturm vacuum survival programing. One person in a million uses it. I stood in the lock, waiting to see what would happen to me.

The sensation was strange. I still had full command of my actions, but there was also a new set of involuntary activities. Without any conscious decision to do so, I found that I was breathing hard, hyper-ventilating in great gulps. My eye-blinking pattern had reversed. Instead of open eyes with rapid blinks to moisten and clean the eyeball, my lids were closed except for brief instants. I saw the lock and the outside as quick snapshots.

The Sturm Invocation had the same effect on McAndrew, as his own deep programing took over for vacuum exposure. When I nodded, he swung open the outer lock door. The air was gone in a puff of ice vapor. As my eyes flicked open I saw the capsule at the top

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of the landing tower. To reach it we had to traverse sixty meters of the interstellar vacuum. And we had to carry Wicklund's unconscious body between us.

For some reason I had imagined that the Sturm vacuum programing would make me insensitive to all pain. Quite illogical, since you could permanently damage your body all too easily in that situation. I felt the agony of expansion through my intestines, as the air rushed out of all my body cavities. My mouth was performing an automatic yawning and gasping, emptying the Eustachian tube to protect my ear drums and delicate inner ear. My eyes were closed to protect the eyeballs from freezing, and open just often enough to guide my body movements.

Holding Wicklund between us, McAndrew and I pushed off into the open depths of space. Ten seconds later, we intersected the landing tower about twenty meters up. Sturm couldn't make a human comfortable in space, but he had provided a set of natural movements that corresponded to a zero gee environment. They were needed. If we missed the tower there was no other landing point within light years.

The metal of the landing tower was at a temperature several hundred degrees below freezing. Our hands were unprotected, and I could feel the ripping of skin at each contact. That was perhaps the worst pain. The feeling that I was a ball, over-inflated and ready to burst, was not a pain. What was it? That calls for the same sort of skills as describing sight to a blind man. All I can say is that once in a lifetime is more than enough.

Thirty seconds in the vacuum, and we were still fifteen meters from the capsule. I was getting the first feeling of anoxia, the first moment of panic. As we dropped into the capsule and tagged shut the hatch I could feel the black clouds moving around me, dark nebulae that blanked out the bright star field.

The transfer capsule had no real air lock. When I hit the air supply, the whole interior began to fill with warm oxygen. As the concentration grew to a perceptible fraction of an atmosphere, I felt something turn off abruptly within me. My eye blinking went back to the usual pattern, my mouth closed instead of gaping and gasping, and the black patches started to dwindle and fragment.

I turned on the drive of the transfer vessel to take us on our fifty-kilometer trip to the *Hoatzin* and glanced quickly at the other two. Wicklund was still unconscious, eyes closed but breathing normally. He had come through well. McAndrew was something else. There was blood flowing from the corner of his mouth and he was barely conscious. He must have been much closer to collapse than when we dropped into the capsule, but he had not loosened his grip on Wicklund.

I felt a moment of irritation. Damn that man. He had assured me that he would replace that damaged lung lobe after our last trip but I was pretty sure he had done nothing about it. This time I would see he had the operation, if I had to take him there myself.

He began to cough weakly and his eyes opened. When he saw that we were in the capsule and Wicklund was between us, he smiled a little and let his

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eyes close again. I put the drive on maximum and noticed for the first time the blood that was running from my left hand. The palm and fingers were raw flesh, skin ripped off by the hellish cold of the landing tower. I reached behind me and pulled out the capsule's small medical kit. Major fix-ups would have to wait until we were on the *Hoatzin*. The surrogate flesh was bright yellow, like a thick mustard, but it took away the pain. I smeared it over my own hand, then reached across and did the same for McAndrew. His face was beginning to blaze with the bright red of broken capillaries, and I was sure that I looked just the same. That was nothing. It was the bright blood dribbling down his blue tunic that I didn't like.

Wicklund was awake. He winced and held his hands up to his ears. There might be a burst eardrum there, something else we would have to take care of when we got to the *Hoatzin*.

"How did I get here?" he said wonderingly.

"Across the vacuum. Sorry we had to put you out like that, but I didn't think you could have faced a vacuum passage when you were conscious."

His gaze turned slowly to McAndrew. "Is he all right?"

"I hope so. There may be some lung damage that we'll have to take care of. Want to do something to help?"

He nodded, then turned back to look at the ball of the Ark, dwindling behind us. "They can't catch us now, can they?"

"They might try, but I don't think so. Kleeman probably considers anybody who wants to leave the Ark is not worth having. Here, take the blue tube out of the kit behind you and smear it on your face and hands. Do the same for McAndrew. It will speed up the repair of the ruptured blood vessels in your skin."

Wicklund took the blue salve and began to apply it tenderly to McAndrew's face. After a couple of seconds Mac opened his eyes and smiled. "Thank you, lad," he said softly. "I'd talk more physics with you, but somehow I don't quite feel that I'm up to it."

"Just lie there quiet." There was hero worship in Wicklund's voice. I had a sudden premonition of what the return trip was going to be like. McAndrew and Wicklund in a mutual admiration society, and all the talk of physics.

After we had the capsule back on board the *Hoatzin* I felt secure for the first time. We installed McAndrew comfortably on one of the bunks while I went to the drive unit and set a maximum-acceleration course back to the Solar System. Wicklund's attention was torn between his need to talk to McAndrew and his fascination with the drive and the ship. How would Einstein have felt in 1905, if someone could have shown him a working nuclear reactor just a few months after he had developed the mass-energy relation? It must have been like that for Wicklund.

"Want to take a last look?" I said, my hand on the drive keyboard.

He came across and gazed at the Ark, still set on its long journey to Tau Ceti. He looked sad, and I felt guilty.

"I'm sorry," I said. "We should have asked you if you wanted to come with us before we put you under. But I'm afraid there's no going back now."

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"I know." He hesitated. "You found Home a bad place. I could tell from what McAndrew said. But it's not so bad. To me, it was home all my life."

"We'll talk to the Ark again. There may be a chance to come here later, when we've had more time to study the life that you lived. I hope you'll find a new life in the System."

I meant it, but I was having a sudden vision of the Earth we were heading back to. Crowded, noisy, short of all resources. Wicklund might find it as hellish as we had found life on the Ark of Massingham. It was too late to do anything about it now. I suspected that this sort of problem meant less to Wicklund than it would to most people. Like McAndrew, his real life was lived inside his own head, and all else was secondary to that private vision.

I pressed the key sequence and the drive went on. Within seconds, the Ark had vanished from sight.

I turned back and was surprised to see that McAndrew was sitting up in his bunk. He looked terrible, but he must have been feeling better. His hands were yellow-paws of surrogate flesh, his face and neck a bright blue coating of the ointment that Wicklund had applied to them. The dribble of blood that had come from his mouth had spread its bright stain down his chin and over the front of his tunic, mixing with the blue fabric to produce a horrible purple splash.

"How are you, Mac?" I said.

"Not bad. Not bad at all." He forced a smile.

"Ready for that lung operation now?"

"Och, Jeanie." He gave a feeble shrug. "We'll see. Let's get on home, and then we'll see. I've learned a lot on this trip, more than I ever expected. It's all been well worth it."

He caught my skeptical look. "Honest, now, this is more important than you realize. We'll make the next trip out more like what you thought you were getting—maybe to one of the stars. I'm sorry you got nothing out of this one."

I stared at him. He looked like a circus clown, all smears and streaks. I shook my head.

"I got something out of it."

He looked puzzled. "How's that?"

"I listen to you and the other physicists all the time, and usually I don't understand a word of it. This time I know just what you mean. Lie quiet, and I'll be back in a second."

All the colors of the vacuum? If a picture is worth a thousand words, there are times when a mirror is worth more than that. I wanted to watch Mac's face when he saw his reflection. ■

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Jay Kay Klein's

BIOLOG

Vincent Di Fate's career is encompassed totally within the modern science fiction that is increasingly influenced—if not quite dominated—by graphic media. In 1967, straight out of art school at the Manhattan Center of Pratt Institute, Vinnie started work as a film animator for a TV show. When this was cancelled, he brought his portfolio to then *Analog* editor John Campbell, and immediately received an assignment.

The first of many Di Fate covers appeared on the November 1969 issue, along with interior black and white illustrations of the lead story. The stark confrontation of a human warmech and a warmech human was quite different from the detailed aerospace covers for which he has since become famous.

Since then, he has worked exclusively in science fiction, becoming one of the first artists to do so. Fortunately, aerospace illustrations are much in demand, and along with other commissions, Vinnie was asked to participate in the APOLLO/SOYUZ program as a NASA artist. Numerous art show awards have come his way, too, along with the Frank R. Paul award in 1978—named after the very first science fiction magazine artist—and the Hugo for Best Professional Artist given in 1979 at the world science fiction convention in England.

Vinnie works entirely in color now, and exclusively in acrylics, generally on hardboard. A typical *Analog* cover takes him three days, while a really complex aerospace painting may occupy five working days. He has lectured at the Smithsonian Institution, Columbia University, New York University, and other colleges. Several years ago, he helped found the Association of Science Fiction Artists, a counterpoint to the Science Fiction Writers of America. He has a monthly column in a non-fiction magazine about science fiction, in which he conducts interviews with other artists to probe into their techniques and philosophy of art.

Born in Yonkers, New York, he has continued to live near the New York City area, now residing in Wappingers Falls near the Hudson River. He enjoys movies, astronomy, photography, model building, and collecting rocks and fossils. Like the rest of us who love science fiction, he reads a lot of it, and dotes on Heinlein, Asimov, Clarke, Sturgeon, Zelazny, and the other great writers.

Vincent Di Fate

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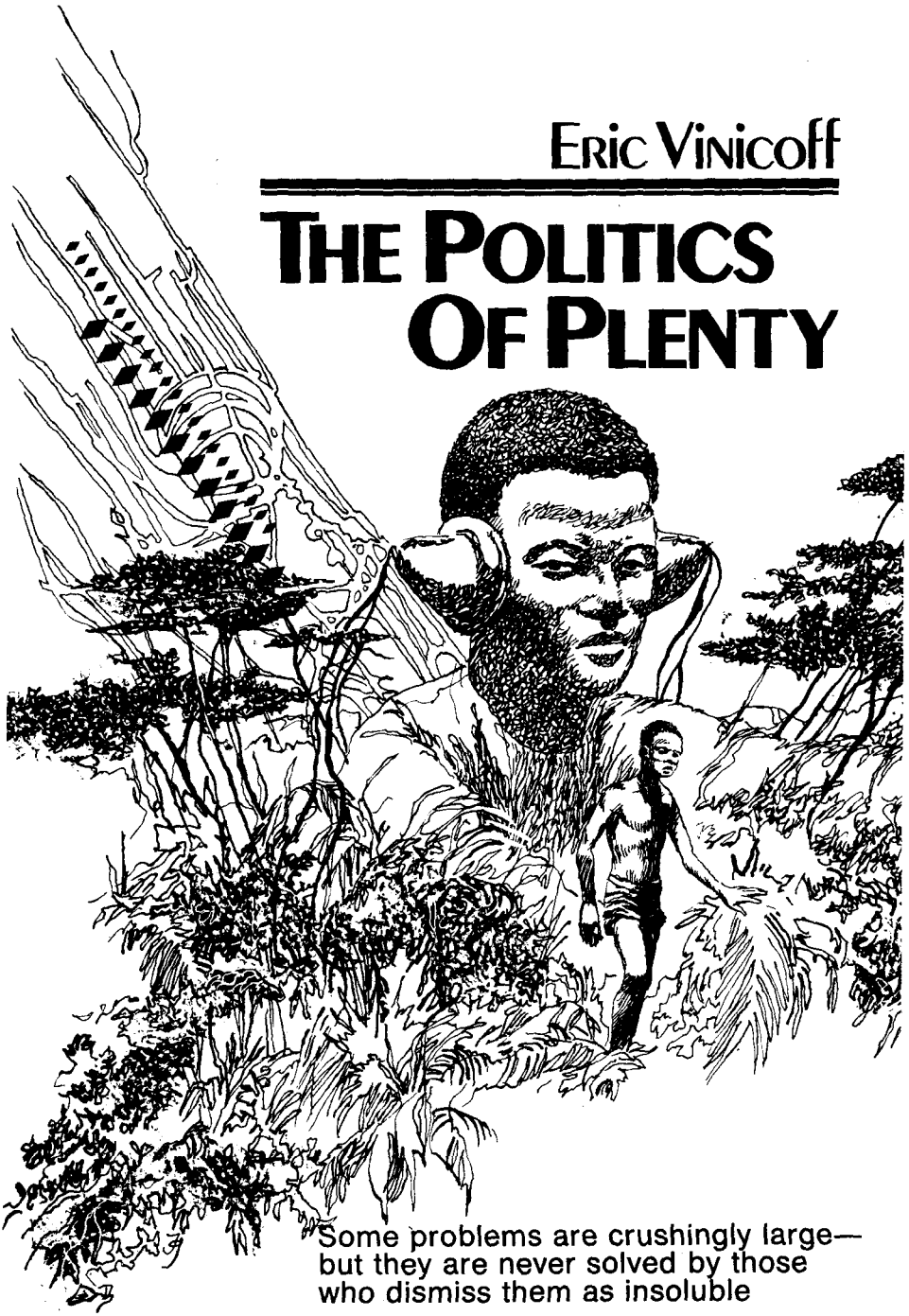
Eric Vinicoff

THE POLITICS OF PLENTY



Some problems are crushingly large—
but they are never solved by those
who dismiss them as insoluble

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Debbie Halverson played dodge with the potholes in the dirt road, and tried to remember why she had left Houston for the 'exotic' life of a Peace Corps volunteer.

Something to do with bringing the good life to the unfortunates of the world, wasn't it? But after seventeen months she was beginning to realize the unfortunates had her hopelessly outnumbered. So why didn't she give it up? Dixie stubbornness, mostly.

Houston would have looked very good to her right now. She was a bit scared.

She sweltered in the open jeep under a cloudless sky. The dry harmattan wind was blowing from the Sahara. The road wound through inland forest at the foot of the Nimba range, ironwoods, whismores and sassywoods fighting for sunlight. In theory it would take her from N'Zerekore to the farm project at Gbanga.

What had her a bit scared was the red light glowing on the dash. The engine could go at any time, and the Liberian interior wasn't AAA territory. Fixing a tire was her limit when it came to car repairs. So she drove and prayed.

Up ahead the forest thinned and became a green valley between low foothills. A small village straddled a rushing stream. In the surrounding fields farmers tended dry rice and cassava.

She cheered up, but not much. This was Bassa country. Like most tribal lands there were no phones, and few other products of modern technology. She spoke enough Mande to communicate, but whites were almost as unpopular as Americo-Liberians in the interior.

She debated going on. Then the jeep decided for her, dying near the edge of the village: about fifty huts clustered around a handful of more permanent buildings. She couldn't see any cars or trucks.

Her arrival became a village event. Naked children and adults ran over, surrounding the jeep at a respectful distance. What little of their chatter she could make out sounded friendly. She said in her halting Mande, "My car has broken down. I need help."

An old, almost toothless man stepped forward. By his necklace and cheek scars she recognized him as the chief. "You are welcome. I am Wutivi."

"I am Debbie. Do you have a telephone or radio transmitter?"

"No."

"Do you have any motor vehicles?"

"No."

"Are there any government officials here? Do any visit regularly?"

Unpleasant noises came from the onlookers. Wutivi spat.

It was beginning to look like she would have an extended stay in this scenic hideaway. Well, she would have to make the best of it. Maybe she could give them some useful tips on agriculture or sanitation.

Wutivi turned to look at his fellow villagers. "Obomi!" he shouted. "Obomi!"

A boy shoved through the onlookers to the chief. He was skinny but not malnourished or sickly. Seven or eight, she guessed. Bright and friendly looking.

Wutivi pointed to the jeep. "Something is wrong with it, Obomi."

Obomi walked around it, staring

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from every angle. He ran his tiny hands over various parts. "I have never seen a car like this before," he said in a high squeaky voice. "Do you have tools?"

She was mystified, but pulled the kit out from under the front seat. Wutivi took it and handed it to the boy.

Obomi unlatched the hood as though he had worked on jeeps all his short life. "What is wrong?" he asked.

"It . . . uh . . . the generator light came on, then the engine just stopped." She felt stupid. Was this some kind of game, a joke on the white woman?

Obomi grabbed two handfuls of tools from the kit, and all but vanished under the hood.

"What's he doing?" she asked Wutivi.

"Fixing your car."

"Is he a mechanic?" The words made little sense to her even as she asked.

"I do not understand that word. He fixes things for us. All sorts of things. Carts. Plows. Looms. The radios the government gives us so we can listen to its lies. Anything in the village that needs fixing. Sometimes cars using the road break down near here—he fixes them too."

"Where did he learn to fix things?"

"He did not learn. He has always known, or so he says. He is an orphan, and lives in my hut cared for by my women. He is strange, but very useful. He looks at broken things, touches them, takes them apart. Then he fixes them."

"That is amazing." If true, she added mentally. "Does he read books?"

"No. He cannot read. None of us can."

"Try to start the engine," Obomi's voice squeaked.

She did. The starter whined, but nothing happened.

After several more minutes of tool noises he asked her to try again. She did. The engine started and ran smoothly.

Obomi reappeared, smiling broadly. He shut the hood and put the tools back in the kit very carefully. He presented the kit to her.

"What was wrong?" she asked.

He frowned. "I do not know. I just made it right."

"Uh . . . thank you." She turned to Wutivi. "Should I pay him or you?"

"We have no use for the government's money. Go now."

She looked at Obomi. She had heard of similar natural talents—math wizards, musical prodigies and so on. But to meet one was slightly unnerving. What a tragic waste of genius. Obomi would live and die in this village, keeping its few simple machines in repair.

Too much of a waste! Maybe just this once she could salvage something special from the morass of misery in which she wallowed. "Obomi has a great gift," she said to the chief. "He should be in the Foreign School at Monrovia, learning to make the most of it."

"No!" Wutivi's expression turned grim. Hostility rippled through the adult onlookers. Obomi retreated beyond them, running back to the center of the village. "Go now!"

She understood the reaction. Obomi was all that stood between the village and the breakdown of what meager technology they had. Gbanga was a full day's oxcart ride away, and the lack of money limited their ability to buy or

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repair. A tragic waste, but she was a guest in this country and in no position to argue the point.

"Very well, I will leave. Thank you for your help."

"Go!"

She went. She drove slowly through the village, then out into the fields, heading toward a low wooded ridge. She could feel eyes at her back until a curve took her out of sight of the village.

"Wait! Wait! Please wait!"

She barely heard the small shouts over the engine. Braking, she looked back. Obomi was running across a rice field toward her as fast as he could manage. He was carrying an old battered toolbox in both arms.

When he caught up with her he was so winded he could hardly speak. "Are there . . . machines that fly . . . and do other wonderful things . . . in Monrovia? I have . . . dreamed for a long time . . . of going to see them!"

"Yes, you can see airplanes there. You can learn about them at the school. And also many other kinds of machines you have never heard of."

He smiled up at her. "Take me to the school, please. I want to see more machines and learn how they work."

"Are you not afraid to leave your home? You will have to live at the school for many years."

He answered by throwing his toolbox into the jeep, and climbing in after it.

She accelerated down the lousy road. "Next stop Gbanga, then Monrovia," she said in English. "Hang on."

Playing with lives was a risky game. She hoped his new future would make him happy as well as more educated.

* * *

Obomi left the freeway just beyond the western edge of Livermore, but barely decelerated as he took the curves of Fish Ranch Road. The Porsche Lectra hummed sweetly under the sound of screeching tires. Climbing into the green oak hills, heading home. He checked the charge display on the dash—when was someone going to develop a decent battery—but the roof and hood solar panels had trickled in enough power during the day. He would make it.

He delighted in passing the raucous alki-turbines that usually ruled the roads. It had taken a lot of money and tinkering, but it was well worth the effort. No one would mistake his car for a LOL's tea wagon.

When he drove alone he lost himself in the efficiency of the machine pushed to its peak performance, and thought of nothing else. But the news he was bringing home was too exciting to totally put aside. The glow warmed him through and through.

Turning onto the private road, he parked in the garage. The 'garage' sheltered five exotic and experimental cars, and was outfitted like the ones Indy racing teams used. Not a lawn mower or bug sprayer in sight.

He went around to the front of the house, where he had seen Lee working. He covered the distance in long strides, though he was only of average height. He looked taller because of his rail-thinness. He kept his hair cut short so it would need less attention. His skin was black—not brown, but definitely and unadulteratedly black.

"Lee!" he shouted. She was at the front yard fence, doing something mys-

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terious to her beehives. "Come here! Big news!"

"In a sec!" Her voice was muffled by the bulky helmet of her beekeeper suit. She looked like a flabby mummy. But appearances could be deceiving. He smiled, and settled into the porch swing.

The house behind him was a broad split-level ranch modern, built two years ago to their specifications. His garage and workshop. Her aviary and library. She had always wanted to live in the style of English country gentry. It pleased him to help her fulfill her dream.

They owned ten acres around the house, and she was rapidly filling it with her farm, orchard, livestock, pets and facilities for the horses she rode in shows and hunts. What with her supplying much of their food, water from a drilled well, and power from roof solar panels stored in a batteries/inverter system, they often joked about rolling up the road and telling the world to take a hike.

Lee soon joined him on the porch. Climbing out of her suit, she stood with the glory of the red/gold sunset behind her. But she was even more spectacular, in his admittedly biased opinion. She was as tall as he, but voluptuous, and stronger than he, built like a Valkyrie. She braided her long blond hair on the sides. Her skin had once been pale, but outdoor life had tanned it almost brown.

One reason they lived so far afield was that, even in these enlightened times, too many people found their marriage something requiring comment, or even action. Especially now that she was noticeably swelling with their first child. They had met at UC Berkeley seven years ago. Their love was as strong now as when they had married, and their friendship was much deeper. They considered skin color a matter of melanin, and nothing more.

But it sometimes bothered him that it didn't bother him. Having grown up among whites, first in the Monrovia school for foreign children, then in the US, he had left the culture of his people behind. Only dim memories and occasional nightmares remained. His thoughts, values and tastes were white. Environment had overcome heritage. And, despite the efforts of some to 'elevate his consciousness', that didn't bother him. He had his work. He had his toys. And he and Lee had each other. Maybe he shouldn't have been, but he was a happy man.

She leaned over and kissed him. "We're going to have plenty of honey soon. Whew! Gets hot in that outfit. Want some lemonade?"

"Sure. After I tell you who visited me at the lab today."

She dropped into his lap, putting an arm around him. Circulation in his legs suffered badly, but he never complained. "Tell me about it, love."

"When Brookings called me up to his office, I thought I was in for another lecture about exceeding budgets. But it was to introduce me to one Mister Solomon, and tell me I'm on an indefinite sabbatical."

She mock-frowned. "What have you done now?"

"Ye of little faith. Mister Solomon is with the UN. He wants me to come to the Basel Institute in Switzerland, immediately if possible, to join an international team working on a top

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security project."

"Why you?"

"Why not me? I must be a rather hot property, judging from the offers I keep getting. How else could we afford all this?" He gestured around the 'estate'.

"You know that isn't what I mean. Why you now?"

He patted her belly. "Rotten timing, true. I promise I'll be back long before our heir arrives. I wouldn't risk missing that. But if you want me close to the hearth, I'll turn it down."

She was used to this sort of thing, since he was much in demand as a troubleshooter. She didn't like him being away. But she never stood between him and the challenges he so enjoyed. "You better call every day."

"Like clockwork."

"Can't you give me just one little hint? Animal, vegetable or . . ."

"I won't know until I get there. Just that it's the Chinese puzzle box of all time."

"Sounds like Mister Solomon knew just how to hook you."

"Probably. My weakness is pretty well known in professional circles."

"When are you leaving?"

"Tomorrow. I have the ticket in my pocket."

She pouted. "Turn it down, like hell! Suppose I had said I wanted you to?"

"I would have been very surprised."

She kissed him. "I'll get that lemonade. What would you like for dinner?"

But he held her when she tried to get up. "Let's sit here and watch the sunset first, okay?"

"Sounds perfect to me."

* * * *

Obomi stepped into the spacious office blinking sawdust from his eyes. He was suffering from the dreaded halfway-around-the-world stratolag. Beyond the big windows noon light was shining on the banks of the Rhine and Basel's picturesque urban sprawl. But his inner clock kept yelling it was bedtime.

The two men in the office rose to shake his hand. Doctor Rasukarno was a lean, elegant Indonesian in his middle years. Doctor Petrie was an older and shorter Frenchman, likewise well groomed. Both exuded confidence and charm. They were physicists, but neither had worked in a lab in years. Obomi knew the type well. Project administrators. Scientists with special skills in management, personnel and wheedling grants.

"I hope you had a pleasant flight," Doctor Rasukarno said in perfect English. "Would you like something to drink, Doctor Bassa?"

"No, thanks." They all took seats.

"How do you like Switzerland so far?" Doctor Petrie's accent was thick.

"The part between the airport and here is beautiful. But I'm more interested in what you're doing here. I'm honored to have been invited."

"We're equally honored to have you with us."

"I never expected to travel quite this far for a job. What can I do for you?"

Doctor Rasukarno fielded that one. "Our team has been at work for several months. To be perfectly frank, it has made little headway. So we plan to try some auxiliary approaches while it continues the main effort."

"But I'm not a researcher. I have a

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doctorate in physics, but I'm really just a glorified electronics and mechanical engineer. I troubleshoot technical problems."

"You're too modest," Doctor Petrie said. "Your 'troubleshooting' has resulted in several impressive breakthroughs. We know of your remarkable personal history, your intuitive, almost psionic ability with mechanisms and electronic devices. I look forward to witnessing your work."

Obomi studied his shoes. He didn't take compliments well, especially from a stranger. "Do you need some equipment debugged?"

"Hardly that simple, I fear. We're bringing in people like you, highly intelligent but with unorthodox techniques, to take a fresh look at our problem."

Obomi nodded. "You don't have to sell me. I'm ready to go to work. When do I find out the big secret?"

The administrators looked at each other. Obomi wasn't particularly sensitive to other people's feelings—except Lee's—but he could tell there was some kind of major tension between them. Finally Doctor Rasukarno said stiffly to Obomi, "Right now."

He handed over a thick folio. "The details are in here: a history, reports from the main team, pictures, X-rays and so on." The cover bore the UN symbol, and a big MOST SECRET.

"We'll give you a brief synopsis now. Then we'll take you over to your lab and introduce you to your partner."

"Why do I need a partner?"

He felt the tension again. But Doctor Petrie smiled blandly as he said, "In an international effort of this importance there are necessary, ah . . . political considerations. No need for you to worry about them. That's what we're paid to do."

Obomi had always found it easy to ignore 'political considerations'. "Okay. I guess I have a partner. But for what?"

Doctor Petrie took a deep breath. "To summarize an intricate set of events, the UN has come into possession of a mechanism from a derelict spaceship discovered by an asteroid miner. The derelict was old, *very* old—and not built by human beings."

First contact! Obomi's windpipe tied itself in a bowline. "That has to be the most important news in history! Why keep it secret?"

"Because of what the mechanism does. After tens of thousands of years in space, it still operates."

"Which is pretty impressive by itself."

"The unknown spacefarers were much advanced over us in the physical sciences. The mechanism's power source was dead, but that minor riddle at least we've been able to solve. We've arranged a substitute source. The mechanism appears to have been a recirculator of sorts. Shipboard wastes must have been fed into it. But the input doesn't matter. We have been able to feed in literally anything. We get back water, and a mixture of gases that must represent their atmosphere."

Obomi raced ahead. Chemistry wasn't his best subject, but he knew enough to eliminate possibility after possibility. Leaving only the answer that would spawn a big research project run by physicists.

He would have paled if he could.

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"Transmutation!"

"Pure and decidedly unsimple. Which is why we're all here. To find out how it's done. What little we've been able to learn indicates that the process should make possible unlimited transmutation of very inexpensive substances and fusion power into *any* substance, at a very low cost. Think of it!"

Obomi skimmed over the obvious benefits to the real excitement: a whole new technology, a fantastic machine to play with.

"Now do you understand the need for secrecy?" Doctor Rasukarno cut in. "The economic consequences will be complex and severe. When we succeed, we'll have to be most careful in releasing the news to avoid creating a panic." More strained glances between the administrators.

"Then you haven't been able to figure out how the machine works?"

"Exactly," Doctor Petrie replied. "Put a modern microchip radio in front of Marconi, and you would have a similar situation. Only our position is worse—we may be facing unknown natural laws."

"When can I see the machine? Now?"

Doctor Petrie chuckled. "Just the reaction I expected from you. Yes, if you wish." He turned to Doctor Rasukarno. "Shall we go?"

The Indonesian nodded curtly. Obomi decided he would be glad to get into his lab and away from whatever 'political' and 'economic' stresses occupied the administrators.

They left the office, and the building. Crossing a beautiful garden courtyard, he looked around in wonder at the distinguished research facility. The effect was slightly marred, though, by the overwhelming UN military presence.

"Don't all the soldiers make it hard to keep your secret?" he asked.

Doctor Rasukarno smiled thinly. "Many people know we're doing something here. Only those who are supposed to know what. Please keep that in mind. Security is absolutely essential."

Obomi found obsessive security stupid and boring, but he knew how to play the game. "I have top FBI and CIA clearances for my fusion work."

"We know that. Otherwise you wouldn't be here."

They entered another building. After negotiating a maze of gleaming corridors, they stopped at a door where a man in a business suit was talking to the soldiers guarding the door.

The man quickly came over to join them. He was tall, middle-aged but in good physical condition. He looked tough, serious and very German. A violent person, Obomi decided. He didn't like violent persons.

"Doctor Bassa, this is Herr Bergenholm, one of our two security chiefs." Doctor Rasukarno made the introductions. His tone plainly indicated that he shared Obomi's opinion of Bergenholm.

They shook hands. "You don't dress like a soldier," Obomi commented.

"I'm with Noreuropan Military Intelligence."

"Herr Bergenholm is on temporary loan to us," Doctor Petrie said. "Not only is he very good at his trade, but he has a special interest in the mechanism. He obtained it for us."

"Really." How ironic that this spy

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should be one of humanity's great benefactors. "You should be very proud. Can we talk later? Maybe you saw something that will help unravel the big riddle?"

Bergenholm had a thin, cynical grin. "We can certainly talk. But I doubt you'll find it useful. I 'obtained' the thing by taking it from those who originally found it, and killing them. But now, if you'll all excuse me, I have to consult with my opposite number, the legendary Señor Guzman."

He left, which pleased Obomi. Then the administrators ushered Obomi through the door.

They were in a dark doughnut of a room, an observation arena looking down through thick panes on a circular 'clean room' lab. Men and women were seated singly or in small groups around the doughnut, staring through the panes and whispering. As Obomi was introduced around, he needed no further proof of the importance of the project than the weight of scientific talent gathered to tackle it. He recognized most of the names by reputation.

Finally the administrators let him go to a pane and look down.

Most of the slick white floor was bare. But in the middle sat a table surrounded by cameras, X-ray machines and other types of scan equipment.

On the table, under the brilliance of the ceiling spots, was a machine the size of a large holovision set.

It was roughly box-shaped, with short transparent tubes sticking from one end, and a wide hopper in the other. Its surface was a dull grey metal, with quite a bit of surface detailing. The whole thing looked like it had been cut with a laser torch from a bigger installation. A bundle of power cables ran from it to one wall.

To a layman it would have looked no more unusual than any other piece of sophisticated equipment. But even at this distance he could feel the *difference*. The whole structure disturbed him. No technology he had ever studied did things that way. And he knew a closer look would make the feeling stronger, not less.

He was almost salivating. "Can I go down and give it a once-over?"

Doctor Petrie coughed. "Maybe we can arrange that later on. But for now you'll have to rely on the data in the folio and whatever you can learn from here. I'm sure you can understand that the mechanism itself is under the strictest possible security."

Obomi understood it was a hell of a way to study something.

"Would you like to see your lab now, meet your partner and get started?" Doctor Rasukarno asked.

Obomi nodded.

The project labs were in the top floor, and work was going on in most of them. They came to a closed door near the end of the corridor. Doctor Petrie led them in.

The lab wasn't overly large, but it was stocked with equipment that Obomi had spent many fruitless hours arguing for at the Lawrence labs. Obviously the project had few budget problems.

A woman, approximately his age, came over to be introduced. She looked Arabic, and, despite her masculine slacks and shirt, exotically attractive. Obomi decided having a partner might not be such a bad thing. He wasn't into

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infidelity, but he could certainly look and enjoy some companionship; he was missing Lee already.

Doctor Rasukarno performed the introductions. "Doctor Obomi Bassa, this is Doctor Zubida Hakam. She has already been here a few days, so she can explain to you the procedures for obtaining any additional equipment, personnel, computer time and so on which you may require—within reason, of course."

He took her hand in his with enthusiasm. "Pleased to meet you."

She smiled up at him—she was a tiny woman, but exquisitely wrought. He had to tear his gaze away from her eyes. They were deep and dark, but they glittered with unspecified promises. "I'm looking forward to working with you." Her voice was low and accented, but her English was good.

"Are you a physicist?" he asked, not recognizing her name.

She nodded. "My doctorate is from Cambridge, but I brought it back to my homeland. I'm a member of the faculty at Yamani University."

He felt a twinge. "Uh . . . what do you think of the job we're facing?"

"I think it's a magnificent event. And a very difficult assignment."

"We'll leave you to get settled in," Doctor Petrie said. "We have to be at our desks most of the time, so the world can find us. If you should need anything, that's where we'll be." The administrators departed.

"Shall we be Zubida and Obomi?" she asked. "It would be much more efficient than Doctor Hakam and Doctor Bassa."

"Sounds good to me." Her eyes were doing things that made him a bit uncomfortable. It was nice to be liked, but he preferred it in gradual increments. He had no idea what inspired it, but he wasn't about to complain.

"Are you married?" she asked.

"Yes." The word exploded from his embarrassment.

"How unfortunate." But her smile and those eyes didn't stop.

"Got any coffee around here?" he asked. She nodded. "Then what say we make some, sit down and figure out where to begin? You've been here awhile; you can fill me in on what's being done. Okay?"

"Certainly." She led the way to the lab's coffee machine. He watched her walk, and wondered why the greatest machine challenge of his life wasn't dominating his thoughts.

The lab's phone wasn't a vid, but he could shut his eyes and see her clearly. "Eat anything you want. Just don't tell me about it."

"But this is an experience to be shared," came the painfully missed voice. "When are you coming home?"

"For all the headway I'm making I could leave today. Three weeks, and not so much as a glimmer of a notion."

"Don't be down. You'll solve it. Then hurry home."

He was sitting with his feet up on his desk. The lab door opened, and Zabida came in. "Got to go now," he said to the phone box. "I'll be back as soon as I can. Take care. Love you."

"Likewise." Click.

He switched off the phone, and pulled the wires from his pocket comp free of it. Zabida stared, frowning. "No

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one is supposed to make calls beyond the Institute."

"I wasn't telling Lee any secrets."

"The security rules are important. We have a serious responsibility."

He was already professionally frustrated and personally unhappy—he didn't need a lecture on rules. "You sound like Rasukarno. Are you going to turn me in?"

Her frown vanished in a sweet smile. "Of course not." She paused. "How did you get a call past the security monitor system? That's supposed to be impossible."

He patted his comp, then slipped it into his jacket pocket. "I built this myself. It does a lot more than calculate. For one thing, I belong to a looseknit club—mostly engineers—that's dedicated to outwitting the phone company. It keeps putting in new computers, new programs. We keep beating them. I haven't had to pay for a long distance call or computer time in six years."

"Why do you do such things? You don't seem like a criminal sort."

"I like to test myself. For fun."

"That has some awesome implications. Could you loot a bank computer by phone and deposit a few million dollars in your account? Without getting caught?"

"Sure. Pretty easily too." Lee had jokingly suggested that very thing when they were first married and saving for their country acreage. "But why should I bother? I earn more than I could ever possibly spend doing what I love to do. Besides, I get honest when it comes to big money."

She perched on the edge of the desk and handed him the folder she was carrying. "Bergman's magnetic flux data for this week. I scanned it—nothing new."

He dropped it on the cluttered desktop without looking at it. "Nothing new. Yes, indeed. At least we don't have to feel guilty about cashing our paychecks—we're not doing any worse than the others."

"I wonder if we'll ever understand the transmutation process," she said softly. "Maybe we're mentally incapable."

"No!" He hardly ever lost his temper, but he was getting close. "Someone built that machine. We can solve it. We just haven't yet."

"It may take a very long time."

"I won't argue that." He looked at the wall clock. "Well, I'm off to meet with the Amazing Two-Headed Project Director."

She chuckled, then grew serious. "You realize it's a waste of time?"

"I've got to try. All these reports, pictures, studies, scans *et al* aren't doing me any good. I'm no theoretical physicist compared to the people they have here. Even looking at the machine up close the one time they let me—surrounded by guards, for God's sake—didn't help. If I'm to be useful here, it has to be my way."

"There's not a chance in the world."

"Sad, but probably true." He stood up.

"Don't forget," she said, "my suite for dinner tonight. You'll need cheering up after the meeting."

"See you at eight."

As he headed for the elevators, he realized he was looking forward to dinner a lot. Zabida was very easy to talk

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to. And hardly shy—the dinner invite had been hers. She was great company while he couldn't be with Lee.

He hadn't mentioned her to Lee in any of his calls.

He fine-tuned his argument sitting in the outer office for almost a half hour before the secretary ushered him into the directors' sanctum.

Doctor Petrie was as effusive as always in welcoming him. Doctor Rasukarno wore his habitual frown. They sat.

"I trust you're receiving all the cooperation you require?" Doctor Petrie asked.

"Yes, I am. Thanks."

"Good. But you look upset. I've seen that expression on many faces of late. I know the work is going slowly, but you mustn't despair. We've just begun."

"Why did you ask for this meeting?" Doctor Rasukarno cut in. "Other matters are pressing."

Obomi launched into his presentation. "You seem to know quite a bit about my special ability. But not enough. I have . . . a feeling for machines. All kinds of machines, as far as I can tell. I can take them apart, put them back together, fix them, modify them, build variations and so on. The ability is subconscious—I don't know how I do it, I just do it.

"But I have learned this much. I have to . . . *experience* the machine. Usually that means taking it apart. Seeing the components and how they fit together, understanding the parts that make up the whole.

"All the second-hand data in the world won't do it for me." He paused. "There's a very good chance I can solve the transmutation machine. But there's only one way. I'll have to open it up and take it apart."

Doctor Rasukarno leaned forward with interest, but Doctor Petrie paled. "I'm afraid that's out of the question! The mechanism is unique! If you were to dismantle it and fail, transmutation would surely be lost to us! That would be a disaster for humanity!"

"I understand your reaction. I don't really expect you to approve such a risk. All I can tell you is it might work."

"How certain are you that you could succeed?" Doctor Rasukarno asked.

"I've never met a machine I couldn't solve. But I've never met a machine like this one. What little we've been able to make out of the inside doesn't look familiar. I wouldn't suggest it if I didn't have a gut feeling I could do it. But I can't give you a guarantee."

"It's much too early to consider such gambles," Doctor Petrie said. "There are still more orthodox—and safer—approaches to try."

"I'm not sure I agree," Doctor Rasukarno objected. "Our orthodox approaches are failing miserably. From our fifty-seven researchers we have at least seventy theories, none of which can possibly be correct. The mechanism is a mystery box which we fear to open. Perhaps now is the time."

"I suggest, my dear Doctor, that you recall the fable of the golden goose."

"Some of us recall it too much. Fear of losing the prize may cost us the prize even more surely."

"And some of us might have other reasons for urging a terribly risky approach," Doctor Petrie hissed.

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The tension in the room went around Obomi's throat like a noose. He still didn't understand it. He hadn't tuned in to the project gossip channels. "If you aren't going to approve my request, I don't see how I can be any help here. I may as well go home."

Both directors regained their composure, but they weren't looking at each other. Doctor Petrie said, "Let's not be hasty, young man. A decision of this magnitude must be carefully considered. At the highest levels. Suppose we meet again in a few days—our secretary will make the arrangements." Doctor Rasukarno nodded his agreement.

Obomi rose. "Okay. Good afternoon."

But he recognized from long and painful experience the deft administrative brushoff. He wouldn't get his chance.

For security reasons the project personnel were all living on the Institute grounds. But this wasn't the hardship it usually was, for the Swiss were much too civilized to subject distinguished researchers to college dorm indignities. The visitor suites were in a beautiful tower, and elegant by any standards.

Obomi and Zabida sat down to dinner at the dining room table. Her suite looked exactly like his—they were too recently arrived and too busy to have added personal touches. A lavish dinner was spread before them. "Did you cook all this?" he asked suspiciously.

"I could have," she chuckled, "with a full day to prepare and much help. But why bother when they have Cordon Bleu chefs in the central kitchen."

They embarked upon the meal, which was as good as it looked. By unspoken mutual consent they kept the conversation light.

But over their after-dinner coffee Zabida said, "It didn't go well. I can tell by what you haven't said."

"Too true. Supposedly Doctor Petrie is going to take it higher up, but the message between the words was clear. Forget it."

She pursed her lips. "I'm sorry for you."

"I'm sorry for all of us."

"You sound very confident. Aren't you afraid you might take it apart without learning how it works?"

He paused. "I gave the directors my rational view, because that's what they deal in. Do you want it too—or what I really think?"

"What you really think, of course."

"Okay. I can solve it. I know I can, because the ability is up here in my skull and I live with it all the time. I can't explain it. But I know. Do you believe me?"

She leaned forward and smiled tenderly. Long tapers on the table lit the room, and the two of them were alone in the intimate yellow universe. "Yes, I do," she whispered. "You're a very special man." She let the various implications hang there for a moment, then added, "But what now?"

"Now we continue with what we've been doing. Studying secondary data. A pure waste of time—no offense, but neither of us is going to see anything the main team is missing."

"I'm afraid you're right. Maybe you should go home."

"Tired of my company already?"

She pouted. "You know I didn't

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mean it that way."

"I know. I'm going to stick around for awhile. The project is heading nowhere in an expensive hurry. Sooner or later the directors will have to face that fact. Then maybe they'll let me try."

She nodded. "That makes some sense. But why are you so determined?"

He couldn't believe the question. "This is just about the biggest thing in the history of science. They'd have to drag me away."

"Have you ever thought about the . . . consequences if we succeed?"

"Consequences—that's a strange way to put it. Just the obvious. Fusion solved the energy crisis forever. The big problem these days is resource shortages. Oil for petrochemicals, metals, minerals and so on. The space and ocean mining, recycling and conservation are just barely holding civilization together. We've depleted the world pretty thoroughly. But transmutation could enable us to produce unlimited supplies of anything we need. We could be on our way to Utopia."

"Idealistic, Obomi, but charmingly naive."

"Huh?"

"You don't pay much attention to politics, do you?"

He shook his head. "I've never understood it."

"Too bad. We scientists must take political responsibility for how our work affects people."

"I haven't heard that kind of talk since college."

"I would think you'd have some feeling for the resource-exporting nations. They're poor lands where most of the people live in terrible conditions. You must remember; you were one of us once."

He felt that twinge again. "I'm not a Liberian or an American. I'm me. Apolitical. Besides, our work here is going to help the whole world."

"You're wrong. If we succeed, we'll destroy Liberia and the rest of the resource nations."

"That's crazy."

"Is it? The main international trouble ever since the resource embargo of '85 and the Collapse has been between the industrial and the resource nations. The industrial nations still hate us for the embargo, and for the frequent price increases and quota reductions. But both of those are necessary because we have less resources in the ground to sell every day.

"We're in a trap. We don't have the industrial or educational base to maintain a modern technology. So we have to import it from the industrial nations, and pay for it with resource sales.

"But now, if transmutation becomes possible, the industrial nations will use it to supply their resource needs. Will they still buy from us so we can buy technology from them? No. They hate us. They would like us to collapse into barbarism—they see it as a fitting revenge."

He found it hard to believe supposedly intelligent national leaders could act like selfish children. But it did explain the strange tension around the project. "Is that why we have the buddy system for everyone from the directors down?"

"Yes. The UN has to show strict impartiality, so the industrial and resource

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nations are equally represented."

"But Doctor Rasukarno seemed to want me to have my chance. Shouldn't he be against the project's success?"

"He probably thought you would fail and destroy the machine forever." She paused. "I don't. I wish you would go home."

"You don't want us to succeed either?" The thought hurt him.

"I don't know. I fear for the people in the resource nations. I don't want to see them suffer."

He shook his head. "I can't believe transmutation would be used so stupidly. There's too much potential value in it for everyone."

She sighed. "Well, it'll be good to have you here, whatever the reason." She got up, walked around behind him and began massaging his neck. "You like?"

"Very much." The dinner wine had him feeling very mellow. All the serious talk drifted out of his head.

"Too bad you aren't leaving," she breathed in his ear. "I was hoping to give you a memorable sendoff."

"Oh?"

"Let's pretend you're leaving." She kissed his neck.

Before he could think about it, he turned and met her mouth with his. It was quite a kiss. He learned a lot in that minute.

She gradually pulled away, and drifted like a fantastically lovely mirage toward the bedroom door. Her eyes and smile tugged at him.

He had no idea why she was seducing him. He wasn't very experienced; the scarcity of women in his field had kept him virtually free of temptation. He didn't want to cheat on Lee. But he was lonely, and Zabida was so exotically beautiful and provocative. So different from Lee, arousing a different kind of desire. It couldn't hurt Lee, since he would make damned sure she never found out.

Actually he was trying to rationalize what he knew he was going to do. He rose and followed her into the bedroom.

She stood beside the big bed. The room was softly lit by red glow panels. The window drapes were pulled shut. She slowly, silently removed her dress, shoes and undergarments. Her skin was glistening like flame.

He felt awkward and juvenile as he undressed.

She stretched out on her back on the quilted bedspread, spreading her arms and legs for him.

He stopped thinking, and went to her.

He settled on the bed next to her, and they kissed. Her arms started to enfold him.

CRAAK!

The window exploded inward as something big came through it. The dark ball uncurled, and became a tall man. A man with a gun in his hand, aimed at them.

"Hold it, Zabida," the man said in a firm tone.

Obomi froze like a two-dollar relay, shocked, embarrassed and utterly confused. But Zabida reacted instantly.

She dove at the man, snarling a foreign word, arms reaching for his throat. She had something small and metallic in one hand.

The man fired.

The pale blue tracer for the IR laser beam dotted her forehead. A stench of

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burning tissue fouled the air. Obomi turned his eyes away so he wouldn't see what else it did to her. But, as she dropped loosely to the carpet, he knew with sick certainty that she was dead.

He had never seen anyone die before, not even as a child in the village.

Most people reacted to extreme shock by passing out, screaming, ranting, stunned silence and/or catatonia. Obomi disassociated. His thalamus went on hold, and his logic centers took charge. Slower than usual. Partially anesthetized. But his brain was functioning.

He recognized the man. It was Bergenholm, the project security chief. Bergenholm calmly slid the gun into its armpit holster, and brushed glass shards from his expensive suit. A soft wind blew through the shattered window, ruffling the drapes.

He reached down and took something like a faceless pocket watch from the dead right hand. "Why don't you get dressed, Doctor. We have to talk."

Obomi did so quickly. "What in hell is going on?" he asked dully.

"Your date for the evening was actually in my line of work. An operative. Quite a good one, though not good

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enough. I've suspected her for some time, but my bug in the dining room confirmed it."

"You were spying on us?"

"That's my job. And luckily for you. She was about to punch your ticket."

"I don't believe it. She was a physicist—I've been working with her for weeks."

"With short-term memory drugs and hypnoteaching an operative can fake just about anything. I know. As for her murderous intent—here." Bergenholm tossed him the 'pocketwatch'. "You're supposed to be a master of machines. See what kind of thrill she was about to give you."

He used a screwdriver from his pocket kit to open the object. He looked, poked and pried—and felt like throwing up.

"Well?" Bergenholm asked.

"I've never seen anything like it. It seems designed to administer a sophisticated pulse of current into a body. A very dangerous pulse."

"A tool of our profession, Doctor. Stops the heart. Looks like a coronary to a casual examination. You would have died apparently of natural causes, under circumstances that would have discouraged a detailed investigation. *In flagrante delicto.*"

He had to believe it. His ability didn't lie to him. "Why?"

"She worked for certain people who don't want the alien transmutation machine figured out. As do Rasukarno and many others around here. This whole project is a cold war waiting for a trigger. And you seem to be it."

"Me?"

"You must have convinced her that you could figure it out and would eventually get the chance. So it became her duty to kill you."

Obomi stared at Bergenholm, so his eyes wouldn't wander to the bloody remnant of what had been so beautiful and special. "She couldn't just . . ."

"Sure she could. Happens in our line of work all the time. But I realize it comes as a bit of a shock to you." Bergenholm seemed totally at ease.

"Did you have to shoot her?"

"She was coming at me with that little heart-stopper. With trained killers you don't take chances."

Obomi's feeling of placid unreality was growing. "She talked about the resource nations wanting the project to fail."

"She was stupidly trying to convince you to quit, so she wouldn't have to risk killing you. Stupid because it tipped me off."

"Was she telling the truth? About the resource nations collapsing?"

"Her side of the truth, yes. It's an economic war, with no love lost. So when transmutation becomes possible, it'll take big, expensive, sophisticated plants, right?"

"For commercial quantities, undoubtedly."

"The kind only the industrial nations can build. Naturally we'll build all we need ourselves first. When we're done, we'll have self-contained economies —technology and resources. Even if we have to pay more for transmutation than imported resources—the main goal is to end our dangerous dependence on the resource nations.

"Of course by then the resource nations won't be able to afford transmu-

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tation plants from us, or any other technology, because we won't be buying resources from them. They'll suffer because they never developed their own technological bases. Their own fault."

"Everyone keeps talking about us versus them," Obomi said slowly. "Whatever happened to cooperating for the common good?"

"A naïve notion, Doctor. Welcome to the real world." Bergenholm frowned. "Though your personal loyalties aren't exactly clear. You straddle the fence, so to speak."

Obomi felt a stirring of emotion again—anger. "If you mean what I think you mean, you're being stupid. I don't care about sides. I'm convinced solving the machine is the right thing. Despite the best efforts of every politician and spy in creation, transmutation will eventually make life better for everyone, Liberian, American or Martian."

The operative smiled. "I won't argue, since we're travelling in the same direction. The problem now is to keep you alive. As I said, Zabida has many allies here. But then so do I."

"I could go home."

"They would find you. Or maybe your wife."

Obomi felt real fear for the first time. Not for himself. He couldn't speak. He tried to think, but nothing came.

"The machine is the key," Bergenholm said. "As soon as someone figures it out, the war will move on to new battlefields. No more reason to kill you."

Obomi's mental processes were slowed, but not stopped. "You want me to solve the machine? My way?"

"Exactly."

"But . . . what if I destroy it and fail?"

"Then you'll have a long prison term to regret your folly. I'll end up like Zabida there."

"Why do you want to take that awful gamble?"

"I've studied you, Doctor. If you're sure you can do it, I'm inclined to back you."

"But you can't give me official permission."

"Hardly. But as a head of security here, I have some authority. I can get you in to the machine for a few undisturbed hours. Will that be enough?"

Thoughts were falling on him like a rock slide. He was lost. He needed Lee's practical advice. But one beacon of light held him to a course. He yearned to peel away the layers of mystery from the alien box.

"I'll make it enough."

"Come on then." Bergenholm started for the door.

"What about . . . her?" Obomi couldn't say the name, or look at her.

"She'll keep. We don't have much time—it's now or wait for the next assassin."

Obomi found walking easier once he was out of the bedroom.

Bergenholm helped Obomi wheel in the last and largest segment of the micromanipulation unit into the 'clean room'. It was well after midnight, and they had the place to themselves. But Obomi kept looking up nervously at the dark observation ring, fearing unseen witnesses. "What happened to the guards?"

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"Coffee break. And when they return, they'll stay out in the corridor and ignore us. They're my people. But Señor Guzman has his people too, and I'm not sure how much they suspect."

"I still don't understand why you're doing this."

"My orders are to see that the project succeeds."

"But why break the rules now? Eventually the project will succeed one way or another."

"Remember what I said about certain people wanting to kill you? Well, that applies to *any* potential success of the project. I have reason to believe that, if success looks imminent, they plan to destroy the machine *et al*. So we have to get there first."

Through all of this Obomi had been positioning and connecting the segments, which were now poised like a prickly horseshoe around the machine on the table. The indicator board was green, and the unit was humming sweetly. He took a sucking breath. "Well, I'm all set." His voice broke.

Bergenholm patted him on the back. "Relax. Have fun. This is what you've been itching to do. Me, I'll just stand over there by the door, out of your way, and listen for visitors. Remember, we don't have an unlimited amount of time." He crossed the gleaming floor and leaned lightly against the wall.

Obomi climbed into the contour chair, and strapped the headset on. His hands moved over the control panel, and his eyes studied the displays. Then he reclined bonelessly.

He became the micromanipulation unit.

For eyes he had cameras—twelve of them, motor-driven, zoom-lensed—as well as radar, sonar, X-ray and other scanning equipment. He had thirty-one types of energy-reading meters for ears. His memory included the contents of the Institute's computer banks. His hands were eighteen specialized waldoes, with feedback circuits to let him feel what they did.

He stared with eyeball magnification at the grey metal from space. He was scared to start. If he blew it, what would happen to him, to Lee?

Go ahead, she said to him. I know you can do it. As for Zabida . . . I forgive you. Just don't ever tell me about her. Love you.

He chuckled at his incipient insanity, and went to work.

First he reviewed everything that had been learned about the innards, all damned little of it. Then he picked a safe spot, and brought in the diamond saw.

He opened the box.

Snaking inside with a fiber optic camera/light, he looked around. His meter-probes began taking readings.

He remembered being very young, wandering in the giant, alien jungle near the village. Well, this jungle was larger (from his perspective) and infinitely more alien. He felt tiny and lost again. Lack of comprehension almost blinded him.

Everything he sensed was going into the computer. An abstract of the machine was forming there. But it was mostly a three-dimensional emptiness so far.

He looked, and listened to his meters. There were things like microchips, only much smaller, and shot through with

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veins of bewildering complexity. There were myriad other components, tightly knit, and virtually none of them made any sense. Most of the components were opaque—he brought in the X-ray and sonar probes.

There were bigger, mechanical parts. These were more clear in their purpose. He examined them, felt them.

They were the key. They were the point at which he could break into the chain of unknown process. Tantalizing strands of ideas, explanations blew around him in a swirling wind. He knew what he had to do.

Go ahead, Lee said.

Bringing in more waldoes, he cut free a part. And fully concentrated all his new senses on it. Consciously he still didn't understand it. But its existence was firmly established in his subconscious.

He removed a second part, and did likewise. Again. Again. Againagainagain. . .

Not understanding, but knowing with gut-certainty that he would, he dismantled the alien machine piece by piece.

There were a lot of pieces. Hours passed.

Finally he was done. The metal case of the machine was empty, stripped. The contents lay neatly on trays all around the horseshoe.

He returned to the macroworld, blinking and groaning. He had the traditional three-aspirin headache.

"You okay?" Bergenholm asked. He was still by the door, looking calm and overly dapper in his formal suit.

"I'll live."

"You took long enough."

"Did I?"

"About three and a half hours. Maybe too long. I think we're about to have—"

The door flew open. A squad of UN Rangers rushed in, rifles at the ready. "You're both under arrest," the squad leader said crisply.

Obomi got up out of the chair very carefully, and removed the headset. Bergenholm put his hands up, so Obomi did likewise. The squad leader patted both of them down, and removed Bergenholm's gun. The silence made the whole event even more grim, an eerie pantomime.

Doctors Petrie and Rasukarno arrived, looking sleepy and disheveled. They stared at the dismantled machine. Doctor Petrie was horrified, but something like pleasure seeped around Doctor Rasukarno's control.

They faced Obomi. Doctor Petrie was visibly afraid to ask the question, but he finally got it out. "Do you . . . understand the mechanism now?"

Obomi stood silently for long moments. Then he shook his head. "It didn't work."

"It didn't work!"

"The machine was too different. I'm very sorry."

"Sorry! You dare to say you're sorry, after what you've done! Do you hope to apologize to all of humanity! This goes beyond sheer idiocy! It's nothing less than treason! You'll deeply regret this, both of you!"

Doctor Petrie had exhausted his breath with the outburst, so Doctor Rasukarno turned to the squad leader. "Sergeant, take these two to Doctor Bassa's suite and hold them there under guard. Neither is to leave until we make further

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arrangements for them.''

''You can't treat us like criminals!'' Obomi exclaimed.

''You may well wish you were mere criminals before this matter goes much further.'' But he was remarkably mild considering the enormity of the disaster.

The squad hurried Obomi and Bergenholm across the Institute grounds to Obomi's suite.

They were all but shoved in, and the door shut behind them. They couldn't be locked in, but they could hear the entire squad on guard in the corridor.

Being back in his temporary home had a soothing effect on Obomi, whose normal calmness had almost been ground underfoot by the terrible night. He opened his mouth, but Bergenholm gestured him to keep quiet. The spy went around the suite with his cigarette lighter, burning several tiny holes in the wall and ceiling plaster. ''That should melt the security mikes. Now we can talk.''

Obomi was shocked. ''You mean you've been eavesdropping on all of us?''

''Sure. Paranoia is an asset in my profession. But put your outrage on hold awhile. Did you figure it out? And answer softly—remember our friends outside.''

Obomi smiled. ''Yes. It wasn't easy—whoever built that machine was *way* ahead of us. But the gears finally meshed.''

''You know how it works?''

''Not exactly. I have enough clues so that the big theoretical brains should be able to work out the details in a decade or two. Generally it does what some of them suspected. It breaks matter down into basic particles—quarks, leptons or whatever—then recombines them into any molecules you want. It does all this with gravity fields/waves/ particles—take your pick.''

Bergenholm scratched his chin. ''I'm no scientist, but if you don't know exactly how it works, didn't you fail?''

''No. That's the beauty of my ability. I don't understand the process much more than I understood the cars I fixed as a child. But I sure as hell understand the machine itself. I can put it back together, and it'll work perfectly. More to the point, I can build others. Units that will transmute rock or garbage into needed resources. Units of industrial plant size to turn out commercial quantities. Building them won't be quick or simple—virtually all the components will have to be made from scratch. But the knowledge of how to do it is behind my forehead.''

''Which makes you the most valuable—and endangered—species in the solar system.''

Obomi was very tired. He collapsed on the sofa. ''I still don't see why you had me lie to Doctor Petrie. Surely *he* isn't out to destroy the project.''

''No, he's on our side. But you can also be sure that at least one of those soldiers outside is an operative who had orders to kill you on the spot, regardless of personal consequences, if you had admitted success.'' Bergenholm was pacing in front of the sofa. ''Now for the next problem. Getting you and/or your knowledge to safety before the other side decides to kill you as a safety precaution.''

''That's absurd! No one would murder a person so . . . so casually!''

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"Zabida tried to. Remember, they're dedicated fanatics fighting to save their countries. True, you're somewhat prominent—that's all that's keeping you alive now. But as soon as they can arrange a non-suspicious 'accident' . . . well, we have to move first and fast."

Obomi was convinced enough to be scared. "What can we do?"

"Good question. Unless we can come up with something better, I may have to take on our doormen."

"You against eight armed soldiers?"

"I didn't say it would be easy."

Obomi started thinking hard. He had to get out of this craziness alive. Aside from personal reasons, he couldn't leave Lee to bring up their child alone. "I can reduce the technical data to words and numbers. If we could smuggle it out to others so it couldn't be suppressed, would that end their interest in killing me?" The words tasted extremely unreal on his lips.

Bergenholm thought it over. "Yes. You're too prominent to be killed merely for vengeance. And I like your plan a lot better than mine. But we're under arrest, remember?"

Obomi pointed to the phone.

Bergenholm shook his head. "You can be sure the monitor system has it turned off."

Obomi pulled out his pocket comp. "Leave that to me. But first I have to put what I know into coherent form, and load it in here. That'll take awhile. So sit down; you're making me nervous."

"*I'm* making you nervous. Do you have anything to drink around here?"

"Beer."

Bergenholm retired to the kitchen alcove, and Obomi went to work. Reducing his almost metaphysical experience to language and math was a lot harder than he had let on. But he concentrated with grim determination. Haltingly, sentence by sentence, he verbally fed the data into the comp. Bergenholm prowled around the suite, sipping beer and ignoring him.

After almost an hour Obomi finished.

But before he said anything to Bergenholm, he sat and thought. Zabida had used the word responsibility. What was his responsibility? Did it go beyond solving the problems he was presented? Was he responsible for the uses others made of his work? Stupid, short-sighted others? As soon as he got the data to safety, the industrial nations would use it to create Utopia—for themselves. In the process they would economically ruin the resource nations. Death, injury and suffering for millions. On the other hand, if he didn't get the data to safety, he would be depriving the whole world of that Utopia. Then there was the slight matter of his impending death.

There had to be a solution. The world was really just a bigger, more complex machine. But one his ability couldn't help him with. He would have to solve this one consciously.

He came up with an idea.

Hooking his comp to the phone, he went about the now-routine procedure of evading the monitor system. When he had a tap-free outside line, he called the Pentagon computer and used the top-level access code he had acquired from another 'club' member. After some delicate nudging, he pried out the information he needed—several phone

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numbers and access codes.

Bergenholm came over and perched on the edge of the sofa, watching. "How's it going?"

"Very well." Very well indeed. But Bergenholm's proximity made him sweat even more—and hope to God the spy had no computer training.

He reduced the data to high-speed pulses. The computers wouldn't have any trouble with that.

He dialed the first number, and fed the computer on the other end of the line a pulse. Likewise with the second dialed. And so on. For about half the computers he had no access codes, but feeding data in around a block was much easier than extracting it. He placed twenty-six calls in all. He could have placed more, but that should be sufficient.

Switching off the phone, he suppressed an urgent need to talk to Lee. Getting her involved could be dangerous for her. Then, as a lucky afterthought, he cleared the data from the comp before pocketing it. He stood up and stretched. "Done."

"Good. Where did you send the data?"

Obomi took a ragged breath. "I'm not going to tell you."

"What?" Bergenholm's expression became menacing.

"You seem to assume I'm on your side because my life is in danger. Well, I'm definitely afraid of death. But I also remember the filth, sickness and misery of the village where I was born."

"You're jumping to their side?" More menace. Obomi backed up a step.

"No. I'm on both sides."

"That isn't possible."

"I hope to hell you're wrong."

Bergenholm's voice softened. "Your intentions may be sterling, but you're an amateur dealing himself into a very serious, complex and dangerous game. Why don't you leave it to the experts?"

"Because you experts are on the verge of screwing up the greatest opportunity in human history."

Bergenholm sighed. "Okay, it's your play. What do you want?"

"I want to talk to Doctors Petrie and Rasukarno. Can you arrange that?"

"Easily. You can be sure you're much on their minds at the moment. But as for staying alive after the meeting—that's your problem now."

"I'll risk it."

Shaking his head, Bergenholm went to the door, leaned out into the corridor and said something to the squad leader.

The directors were installed behind their desks. Bergenholm was slouched in a chair, reporting to them in precise sentences. Obomi filled another chair, listening and silently rehearsing.

If he did this wrong, it could be a long time before he saw Lee again. Maybe forever.

It was about three hours shy of dawn, and the night beyond the windows was still jet black. The overhead lights were muted; shadows pooled all around the office, setting a properly Gothic mood for the discussion.

They were alone, but Obomi was subliminally aware of the soldiers waiting just outside.

Bergenholm was finishing a detailed narration of his role in the night's events. ". . . So Doctor Bassa said he wanted to talk to you. It seemed like

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the best course, so I talked to Sergeant Doc, and here we are."

Both directors looked overtly under control. But Doctor Petrie's face was flushed with hope, while Doctor Rasukarno seemed to be wrestling with unhappy thoughts. "We've been in contact with our superiors," the latter said to Bergenholm. "You're to return to Noreuropa tomorrow. Discipline for your role in tonight's folly will be left to your Military Intelligence head."

Bergenholm yawned. "Don't pretend you're doing me any favors. You'd have to send me back whether you wanted to or not—you've no jurisdiction over me. As for discipline, I'm sure that'll hinge solely on the outcome of this affair—which is still very much in doubt."

Everyone was looking at Obomi, who cringed slightly. Doctor Rasukarno let some of his inner anger and suspicion show. "Doctor Bassa, you claim to have learned the transmutation process?"

"Yes."

"If I were in your place, I might lie to escape punishment for my recklessness."

"You'd be pretty stupid if you did. The moment the first test rig was built, the lie would be obvious."

"You could be deluding yourself," Doctor Rasukarno muttered, but his voice lacked conviction. Both directors were very familiar with Obomi's career.

"I think we can take your success as a fact for the moment," Doctor Petrie said firmly. "Let's return to the main issue. That knowledge is of the utmost importance to humanity, Doctor Bassa. You'll give it to us now."

Doctor Rasukarno's hand was poised near his com box. He seemed to be nerving himself up to something. Bergenholm looked worried.

"No," Obomi answered.

"You must!"

"No, I won't."

Doctor Rasukarno relaxed slightly. But Doctor Petrie was losing his suave manner. "There are ways you could be forced to reveal what you know. Drugs. Physical pain. Or perhaps indirect threats to someone like your wife. I hate the thought of such measures—I hope you won't make them necessary."

Obomi was a nonviolent man, but he was halfway out of the chair on his way to the scrawny French neck before he could stop himself. That wouldn't protect Lee. "Go to hell," he whispered, and sat back.

Doctor Petrie turned to Bergenholm. "You're an expert on the subject. Please tell Doctor Bassa how unpleasant it could be for him."

"I'm afraid the bad news is for you, Doctor Petrie," the spy replied. "Doctor Bassa, because of his top-security work for the US Government, has had a full course of CIA mindwipe conditioning. It's state-of-the-art. Not even the KGB can crack it. If anyone tries to force anything out of him, directly or indirectly, it gets permanently wiped from his memory."

Doctor Petrie frowned. "This whole situation is ridiculous! What do you want, Doctor Bassa?"

"I want transmutation to benefit the whole world."

"But of course it will!"

"Bull. I've had the recruiting speeches from both sides. Well, I've made sure

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the industrial and resource nations will have to cooperate for their mutual benefit."

Doctor Rasukarno leaned forward. "How?"

"I separated the data on the transmutation process into two parts. Neither is sufficient alone, even if the best scientists in the world try to extrapolate from it. The technology is too wide. One half is now stored in the top-security computer systems of the major industrial nations. The other half is likewise stored in the top-security computer systems of the major resource nations."

Doctor Petrie's face turned sheet-white. Doctor Rasukarno grinned wolfishly.

"You fool!" Doctor Petrie shrieked. "You've played right into their hands! All they have to do is erase the data, or withhold it, and we'll never get it! Transmutation will be lost forever! Idiot!"

Doctor Rasukarno didn't even bother to deny the accusation.

"Yes," Obomi admitted, "that might happen—if everyone remains as stupid, short-sighted and selfish as they have been so far. But I don't think they will. They can't afford to."

"Why is that?" Doctor Rasukarno asked, smiling.

"We all know how desperately the industrial nations need transmutation. What everyone seems to be ignoring is that it's vital to the resource nations too."

"I don't follow you."

Obomi's voice thickened. "I know what life is like for most people in the resource nations, all too well. It's terrible. And on a hopelessly downward spiral."

"I resent that. We're making great strides—"

"No you're not. You can't possibly. Your populations increase while your resources in the ground decrease. Many of your mines and wells are already depleted, and the rest won't last much longer. Your wealth goes to importing food, energy and what little technology you have. You haven't the money or the resources left to develop modern, healthy, well-fed, fulfilling societies for more than a handful of your citizens. You can drive a half hour from your modern capitals and find yourself in almost pre-industrial squalor. And each day you have less resources, ergo less money and less hope for progress."

Doctor Rasukarno said nothing. Doctor Petrie and Bergenholm were listening intently.

"Now comes transmutation—your best and maybe last hope. Instead of a world slowly running down from resource shortages, we can have a world free of material want. An unprecedented economic boom in the resource as well as industrial nations. Food. Health care. Energy. Employment. Decent housing. Education. Outlets for the creative. And much more. In other words, the finest that modern technology can offer for everyone."

"You paint a lovely picture," Doctor Rasukarno said. "But it's a dream. Reality is much less optimistic."

"I didn't say it would be easy. It won't be. But the crux, the key, is that both sides understand it's to their advantage to cooperate."

Doctor Rasukarno rubbed his chin.

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"There is a sizeable moderate faction among us that advocates something like what you say. But the intransigence of the industrial—"

"Intransigence!" Doctor Petrie exploded. "Us!"

"Both sides will have to compromise," Obomi cut in. "I imagine it'll be a long, tricky, nasty bit of negotiating. Thank God I don't have to have anything to do with it. That's where your 'political experts' take over. I've just made it essential that they finally work out a deal, or everyone loses.

"I won't even guess at the details, but the general points seem obvious. The industrial nations will have to build transmutation plants for the resource nations as well as themselves. Transmuted resources will have to be taxed—they'll eventually be quite cheap to produce—so imported resources can sell competitively. And the industrial nations will have to supply massive aid to develop self-sustaining modern technologies in the resource nations. Unlimited cheap resources should make this possible for the first time. Care will have to be taken through all of this to prevent economic panics. The next few decades should be a very exciting time to live in."

Doctor Rasukarno took a long breath. "Obviously no one in this office makes such decisions. But we do report to those who do. We will pass on what you have told us." His words were guarded.

"You have no idea of the dangerous forces you've released so casually." Doctor Petrie was almost lost in thought. "But it's done now, and we'll have to make the best of it."

Obomi couldn't tell if he had convinced them. Then, out of the corner of his eye, he saw Bergenholm. The pragmatic spy was slipping him a covert thumb-up.

"I, ah . . . think you should bow out of the project now," Doctor Petrie said. "Obviously your continued presence would be, ah . . . difficult. Please remember the security restrictions after you return home—those you haven't already violated. When news of the transmutation process is made public, then you will reap the publicity for your accomplishment."

"Don't worry—I don't plan to talk. In fact I'd appreciate it if you would leave me out of any publicity releases. Credit the success to the project as a whole. I don't want media types on my doorstep. I just want to go home."

"Excellent. I suggest that you return to your suite and sleep until late tomorrow. By then Doctor Rasukarno and I will have, ah . . . confirmed certain parts of your report, and consulted with our superiors. Then we'll transport you to the airport and a *bon voyage*."

Obomi yawned. Adrenalin or no, it was very late for him, after a totally draining experience. "Thanks. I think I'll do just that."

He rose. Bergenholm rose too. "I think I'll walk Doctor Bassa back to his suite."

The directors agreed, so Obomi and Bergenholm left. The Ranger squad didn't follow them.

As they crossed the dark garden courtyard, Obomi was almost falling over from exhaustion. "Thank God that's over."

"Likewise," Bergenholm chuckled.

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"You handle yourself pretty well. If you should ever want another taste of it, give me a call. Military Intelligence, Heidelberg. I can promise you some interesting problems."

Obomi was repulsed by the idea, but oddly flattered too. Maybe it was just the glow from escaping that office with his full hide. "No way. What I did was from necessity, not for entertainment. All I want out of life is waiting at home. The sooner I get there, the better." ■

IN TIMES TO COME

● Next month's lead story, with cover by Paul Lehr, is the most ambitious entry yet in a popular series. A joat, as you may or may not remember, is a jack-of-all-trades, specializing in pulling together the most remote-looking scraps of seemingly unrelated knowledge and skills to solve problems defying more conventional approaches. In "Paradise Misplaced," Ian Stewart's new tale of Billy the joat, the problem is a missing island. It was there, you understand, but then, quite abruptly, it wasn't. . . .

Margaret L. Silbar's fact article is called "And Now, Supergravity!" but it's really a bit more than that. Supergravity is just one of the latest contenders in physicists' ongoing search for a unified field theory, and to talk about supergravity, she incidentally provides a good survey of the whole problem. It sounds a bit esoteric, but it's definitely not irrelevant to reality.

And, of course, we'll have the conclusion of Lee Correy's "Shuttle Down" and the usual assortment of other stories and features.

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Robert
McMahon

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LEE CORREY

Part Three of Four Parts

SHUTTLE DOWN

The Atlantis was the first space ship downed in an alien culture. But that culture was a lot closer to home than anyone had anticipated.

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SYNOPSIS

After the Space Shuttle Atlantis *makes an emergency landing on Easter Island (Isla de Pascua) in the South Pacific, Shuttle Commander FRANK KING and his crew—co-pilot LEW CLAY, payload specialist HAP HAZARD, and mission specialist JACKIE HART—are welcomed by the Chilean military governor CAPTAIN ERNESTO OBREGÓN. The NASA recovery team gets under way led by Mission Manager RED RICHARDSON and accompanied by NASA Public Affairs officer CASEY LASKEWITZ and State Department Latin American expert JOYCE FISHER. The landing of the* Atlantis *has caused an international incident because there is no prior emergency landing agreement between NASA and Chile, although the Chileans agree to permit NASA to come in with Air Force transports to recover the* Atlantis *provided the United States meets certain "conditions" such as payment of all costs incurred by Chile, consignment of temporary housing and construction equipment to Chile, and use of Chilean construction crews to expand the Mataveri Aerodrome on Pascua.*

The Soviet Union has accused the United States of using the Atlantis *to orbit a military beam weapon satellite. Handling this accusation in addition to coordinating the State Department's role in the recovery keeps ALFRED M. DEWEY busy in Washington far beyond the scope of his bureaucratic job description. The Chilean government has also stipulated that one of the conditions for permitting NASA to recover the* Atlantis *is that a Chilean commission inspect the payload of the* Atlantis *to protect Chile against the Soviet claims. While this is going on, reconnaissance satellites have spotted the departure of two Soviet naval vessels—a carrier and a guided missile cruiser—from Vladivostok, headed in the direction of Pascua.*

During their first evening on Isla de Pascua, the crew of the Atlantis *is honored by a hula, a Pascuan party on the beach overlooked by seven of the huge* moai *or stone statues of Isla de Pascua. Frank and Ernesto Obregón strike up a strong friendship. So do Lew Clay and Jackie Hart, although their relationship is far from platonic. Hap Hazard turns the Pascuan party into a South Seas disco. By and large, the impact of the NASA space crew on the Pascuans is less than the effect of the Pascuan culture on the space crew. Hap takes off his shoes to dance, and so do Jackie and Lew . . . and all three end up going barefoot because the Pascuans have no concept of property.*

The following morning, Hap Hazard is seriously ill with bacillary dysentery that he thinks he got from drinking a fermented Pascuan milk concoction during the hula. Frank and Lew must return to the Atlantis, *which is still loaded with toxic propellants, in order to get the antibiotic drugs out of the medical kit.*

In the meantime, Joyce Fisher manages to untangle Chilean governmental red tape in Santiago and get the initial three-plane flight to Pascua, thanks to her years growing up in the Chilean capital and her knowing many of the people who are now in high positions in the government. She also helps Casey handle a sticky situation with ALICE ARNOLD, an anti-technology, women's

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lib Washington reporter who managed to talk her way onto the initial flight because of her inside knowledge of Washington.

Although the first planes of the rescue mission finally arrive on Isla de Pascua and NASA crews manage to drain the toxic propellants into safe containers, problems begin to develop. Alice Arnold is obviously going to make a play for Frank King, who's a happily married man with a wife and children in Houston. And a basic conflict of personalities surfaces between Red Richardson and the Pascuan military governor, Captain Ernesto Obregón.

CHAPTER NINE

Captain Ernesto Obregón flatly refused to discuss anything having to do with the *Atlantis* during the dinner he gave for the three crew members, Red Richardson, Casey Laskewitz, Joyce Fisher, and the two reporters. Father Francisco, Doctor Esteban, and José Hey were also there.

The setting was outdoors in a small patio of the garrison's casern. It was, as usual, a lovely evening with the southeast trade winds blowing and a gibbous Moon rising over Rano Raraku's quiescent volcanic cone. While the dinner wasn't lavish, the food was good, albeit lacking many things the Americans took for granted such as fresh fruits.

Obregón changed the subject every time Red tried to discuss the work that needed to be done to recover the *Atlantis*. The conversation turned to small talk and personal subjects. If the others didn't understand what was going on, Joyce did. She knew this was a social affair so that the military governor could get to know the newcomers better . . . and to allow the Americans to get to know those with whom they'd be dealing on Isla de Pascua.

It served its purpose magnificently.

Obregón had a fine collection of wines and liqueurs because both the wines served with the meal—something Red would call barbequed shish-kabob with lamb and the few vegetables grown on the island—plus the liqueur served afterwards definitely didn't come from Isla de Pascua. They were, Joyce decided, either Peruvian or Spanish in origin. Captain Ernesto Obregón was obviously a connoisseur.

The grace and dignity of the simple dinner, plus Obregón's persistent refusal to permit it to turn into a business discussion, had its effect upon the Americans.

Red Richardson discovered at the end of the meal that he'd somehow managed to relax. Getting the *Atlantis* off the runway tonight didn't seem to be such a pressing task. *What the hell,* he thought, *let the rest of the group have a night in Santiago to relax and catch up on things.* Twelve hours' delay in his unofficial and unannounced schedule didn't seem to be a matter of life and death.

When Alice Arnold discovered she wouldn't be able to use the island's radio station to file her coverage back through Santiago—the radio station was monitoring any transmissions that might come in from Santiago, and Obregón refused to permit it to be used for other purposes—she started to throw a media tantrum, discovered it wouldn't do her any good, and finally began to relax, too.

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By the time they were sipping the fine liqueur after the meal, all the Americans had come to the conclusion that they were, for all intents and purposes, almost on another planet. The fact that they couldn't contact their bosses and supervisors also meant that those same bosses and supervisors couldn't contact them, not this evening. Whenever the satellite ground station was set up and functioning, they'd become part of Planet Earth's system again. In the meantime, there seemed nothing better to do than to relax and enjoy it.

Red thought it might be a long time before he had this sort of a chance again.

"A wonderful dinner, Captain, and a most gracious welcome to Easter Island for us," Casey remarked.

"This is Isla de Pascua," Father Francisco reminded the public affairs man. "Or, to be more exact, the native name is Rapa Nui . . ."

"What would you prefer we call it, Father?" Casey asked.

"It is correct to use either name," the priest explained.

"The ancient name given to it by the original settlers from the coast of South America is unknown," José Hey added, "but the name Rapa Nui was given to it by the second wave of settlers that arrived eastbound out of the Polynesian Islands."

"The Europeans called it Easter Island or Isla de Pascua because the Dutch captain Roggeveen first sighted it on Easter Sunday in 1722. We Chileans call it Isla de Pascua," Obregón put in.

"That's what it's called on the aeronautical charts, too," Frank pointed out.

"I'm going to have to call it Easter Island in my reports," Alice Arnold said. "Most Americans won't recognize it otherwise. They don't even have any idea where the hell it is."

"I've often wondered why your reporting style's different, Alice," Herb Haynes put in. "I'm beginning to understand it now. To you, readers are stupid, right?"

"Damned right! Most of them didn't pay any attention to what they were told in school, and they don't pay too much attention to anything except what's splashed all over the wall in front of them in big fluorescent letters," the woman reporter shot back. "And they'll forget it all the next day. I report the news on that basis. If I didn't, all I'd get would be a sidebar on page ninety . . . and I'd be looking for another job."

"I recall Hugh Downs once suggested we were 'overcommunicated,' which meant that we were being bombarded by so much information all the time that we couldn't assimilate it, so we treated it as entertainment," Herb Haynes observed quietly.

"Well, that isn't the case on Pascua . . . at least, not tonight," Casey said with a sigh. "But the minute we get that ground station set up, it's going to hit the fan as usual . . ."

"Señor Richardson," Father Francisco asked, "I noticed it at first in Frank King before he and the other members of his crew grasped the reality of Isla de Pascua. And I have noticed it in all of the people who flew in this afternoon. Why are you so anxious to work twenty-four hours a day to get the *Atlantis* back to the United States?"

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Red Richardson had an immediate answer. "Because the whole future of our space program depends upon the space shuttle being a big success in this decade."

"More than that," Frank added, injecting his own viewpoint on a subject he'd put a lot of thought into, "the future of the whole human race rides on the *Atlantis* and her sister ships. Our future is *out there*." He waved his hand toward the waning Moon and the strange southern constellations in the sky. "Like every other frontier, pioneers have to go out and prove its worth to the rest of the human race."

"If we don't do it *now* while we have the capability to get started," Casey said quietly, "we may not get another chance . . . not if we're stuck on this planet and running out of raw materials and energy . . . plus continuing to breed far more people than the planet can continue to feed. This is a closed system, and the shuttle is the first step in opening things up so that we can begin to work with the whole solar system."

Father Francisco sipped his liqueur thoughtfully for a moment. Then he suggested, "Look around Pascua while you are here, my friends. I do not claim that Pascua and its people are generally representative of the rest of the world. Probably not. But look around and ask yourselves the simple question: What can space do for the Pascuans that they need to have done, that they could not do for themselves, and that would not merely change but improve their lives? Do not give me a hasty answer to that one, because there is no answer until you have observed this island closely."

"The technology we're developing in our space program can make the lives of people everywhere better and easier," Red began.

"With no insult intended, I have generally found that Americans simply don't understand the world," Doctor Esteban interjected. "The world—and Pascua—has problems that need technology to provide the solutions. But not just high-technology answers like the data that can come from the Landsat, but real and—if I may be permitted to use the term—down-to-Earth answers that can be used on the personal level. The rest of the world is not the United States and would perhaps take centuries to reach your level, if indeed your level is a desirable and attainable goal for many peoples, which it probably isn't."

"Those are very difficult questions you've asked us," Casey observed. "Even in the United States, we have trouble trying to get the basic realization of the potential of the Shuttle and space across to people who're living in high technology every day. Your questions are a lot tougher . . ."

"But when you have found answers to them, you will have no trouble getting anybody to support your pioneering efforts," the doctor stated. "You may be able to find some answers here."

"Here? On Isla de Pascua?" Red asked in disbelief.

"I would like to point out," Father Francisco said quietly, "that the Pascuans call this island *te Pito o te Henua*, the Navel of the World."

"Ernesto, your fine wines and liqueurs have mellowed me to the point where I find myself wallowing in philosophy, which is certainly well beyond

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the accepted mental capabilities of a mere Air Force officer and NASA shuttle pilot," Frank remarked. "But if this is the Navel of the World, permit me to quote a Russian who also viewed space travel from the viewpoint of childhood: 'The earth is the cradle of reason, but one cannot live in the cradle forever.' If answers to these questions can be found here at the Navel of the World, maybe we can cut the umbilical cord more quickly . . ."

The military governor raised his glass. "Here's to space and to your search for answers . . . although I still don't understand your relentless desire to accomplish such an expensive and difficult task."

"To space. We're doing it because it's there," Frank responded.

"And because it's our job," Red added.

"And because if we don't do it, either it won't get done or somebody else will do it in a way we don't like," Casey said.

"Like the Soviets with their orbital weapons," Frank said.

"Ah, but you have them, too!" Doctor Esteban pointed out.

"Reconnaissance and communications satellites, yes. But not orbital weapons," Frank said. "At least, to my knowledge."

"With only four Orbiters, we haven't got the lift capability to do anything like that," Red explained with a touch of disgust in his voice. "If we were, I'd hear some scuttlebutt about it or could make some shrewd guesses based on the published NASA mission schedules. No, the Soviets are the people who have the lift capability for orbital weapons systems—which leads me to believe their claims may be part of a cover-up."

"That's not the root of the Soviet matter." It was Joyce who spoke up for the first time in many long minutes. "True, we know the Soviets are interested in the military utilization of space, but they've also got a significant industrial processing capability that they're developing rapidly with their *Salyut* space stations. I handle a lot of technology export matters, and I can tell you that the Soviet Union is rapidly growing into a strong international competitor for the United States in high technology, especially high technology derived from space."

"What's behind the Soviet move then, Joyce?" Red asked.

"Frankly, I think their move in the UN is designed to blunt any possibility that we'll evolve competitively in space manufacturing. We walked away with space communications, but the Soviets want to lock up space processing for themselves. The best way to do it is to discredit our shuttle program and force us to curtail it in the face of international criticism," Joyce observed from her unique viewpoint.

Casey shook his head. "I never thought about it that way."

"That's the way I have to approach most of the problems my boss tosses in my lap," Joyce pointed out. "*Never* believe the rationale that's on the surface. You've got to dig beneath the headlines and the official announcements and ask yourself who's doing what to whom and who's going to profit from it, monetarily or otherwise."

"Damn! I left my cassette recorder at the hotel," Alice discovered.

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"You mean you can't remember things without it?" Herb wanted to know.

"Who remembers anything anymore? The only thing you have to remember is where it's stored on tape or film," Alice pointed out.

"Except when you're in a place like Pascua where there are no microfilm or videotape libraries," Casey remarked. He thought a moment, then exclaimed as if it were a sudden realization, "We're a long way from home!"

"Are you so certain of that, Miti Laskewitz?" José Hey wanted to know.

"Huh?"

"This is, after all, my home," the Pascuan pointed out. "*Y mi casa es su casa.*"

Obregón added, "Here you're probably closer to the 'home' situation of generations of your ancestors than in the United States."

"That's going to change very rapidly," Red said. "To get the *Atlantis* out of here, we're bringing in a lot of equipment and more than a hundred people. It can't help but change things, even though we'll be here less than two months."

"Quite possibly. In fact, very probably," the wiry little military governor agreed. "I don't know whether or not the effects will be helpful to the Pascuans or to Chile's situation here on Pascua."

"Governor," Herb Haynes put in, "you were curious about the NASA people's apparent obsession with the shuttle and space. I'm wondering what an educated and diplomatic man such as yourself is doing here as the military governor of Isla de Pascua two thousand miles away from Santiago . . ."

Obregón looked him right in the eye and replied levelly, "Because it is my job."

"*Touché*, Ernesto!" Frank said.

"Can we go somewhere where there's some light?" Red wanted to know, unconsciously slipping back into his role model as a NASA manager. "We need to talk about our schedules, where we're going to put things, and what we need to do."

Obregón looked up at the southern skies with their strange star groupings—constellations with which the Americans were not familiar. The Southern Cross rode in the meridian. "It's a lovely night, and the hour is late," he observed. "It's been a difficult and trying two days for all of us. You've travelled far."

"Everyone who comes to Isla de Pascua has to travel far," Father Francisco added. "It is probably the farthest place on Earth these days."

"It is also capable of providing enjoyable moments such as this, which can be few and far between elsewhere," Doctor Esteban put in.

"I'd rather see this evening end on a pleasant and restful note, because tomorrow we'll have to face the realities of the *Atlantis* and the consequences of her landing here. I agree with Señor Richardson: we must discuss what's to be done and where we're going to put things. In the interim, let's leave them where they are tonight. Shall we meet at my quarters tomorrow morning at, say, nine o'clock?"

And that was all there was to it. Red couldn't bring any pressure to bear on Obregón. The Chilean naval captain

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was the boss, period, and he'd driven home that point with the dinner that evening. It had been a subtle and mannered method of asserting the military governor's ultimate authority, and Obregón had done it with such diplomacy that Joyce was forced to admit to herself the man was well-chosen as Pascua's military governor . . . and that the international diplomatic world would undoubtedly see more of Captain Ernesto Obregón in the years to come.

As the American party walked through the streets of Hangaroa back to the hotel, Red remarked, "I'm relaxed as an old rag, but I don't think I'm going to sleep very well tonight. I keep thinking of everything we've got to do tomorrow . . . and the next day." Obviously, he wasn't accepting Obregón's assertion of power and control.

"Red," Frank admitted to him, "I was the same way two nights ago before these people got to me with their more relaxed way of approaching problems. I'll bet you'll sleep like a baby . . . like you haven't slept in years."

"Maybe so."

As they walked through the dimly lit lobby of the hotel, Frank noticed for the first time that two of the party were missing. He didn't say anything about it. But in the absence of the two reporters, he might tactfully ask Lew tomorrow where the co-pilot and Jackie had gone after the social occasion had broken up. The command pilot of the *Atlantis* had been able to control the strong drives that had arisen after the very hazardous landing; he knew he couldn't expect his other crew members to do the same . . . at least not Jackie and Lew. He didn't want to know the details; that was part of their personal lives. But he *did* want to know the broad generalities in case, as command pilot, he might have to handle any problems as a result. Lew could be a problem; Jackie was and had been a problem for a lot of people for a long time. And the environment was conducive to creating problems.

It's never the technical problems, he told himself. *It's the problems created by people that are the biggest headaches.*

And there were going to be both technical and political problems to beset all of them.

"Sullivan, how did it go today?" Alfred M. Dewey was putting in another late evening.

"The NASA briefing team did very well," Nash Sullivan reported from the United States' UN office in New York. "Most of the Security Council members were convinced that we've got a Landsat aboard the *Atlantis*."

"Were the Soviets there?"

"No. They weren't expected . . . officially, that is. But they had people observing for them."

"What's your assessment of the possible Security Council vote on the Soviet resolution to send in a commission?"

"I think the Security Council will be willing to accept a report from a Chilean commission. So it probably won't come up for a vote until after the Council sees what the Chileans have to say. If the Chilean commission confirms our documentary evidence, the Soviets'll undoubtedly press for a UN commission. The staff here doesn't know whether or not to abstain or exercise the veto."

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"Neither do I, but I'll try to get some answers tomorrow," Dewey replied, making notes again. He'd used up three yellow ruled pads thus far.

"When's the Chilean commission due to land at Pascua?"

"Tomorrow, once the NASA team gets the *Atlantis* cleared off the runway so the chartered jet can land. We may have a preliminary report from them by tomorrow night or the day after at the latest. According to the Chilean *chargé* here, the matter's very sensitive and potentially embarrassing to the Chilean government . . ."

"I'd suspect so if the payload were indeed an orbiting beam weapon satellite," Nash Sullivan remarked.

"Incidentally, the Secretary has advised the Chilean ambassador in Washington of the Pentagon's detection of two Soviet naval vessels proceeding across the Pacific from Vladivostok toward Isla de Pascua," Dewey said quietly. "You may be asked by the Chilean UN delegation to confirm this, and you may do so."

"Aha! That's a new wrinkle. Will we respond?"

"I suspect the Armada de Chile may do something." Dewey dodged the question. He'd discovered through his own underground network that the U.S. Navy was planning to dispatch the aircraft carrier *Kitty Hawk*, the guided missile cruiser *Halsey*, and the guided missile destroyer *Cochrane* in the direction of Isla de Pascua as soon as they could be made ready for sea at Pearl Harbor and San Diego. The Soviets would learn this soon enough through their own recon satellites as well as from espionage agents. "But keep it in mind, because we may wish to initiate some action in the Security Council if the Soviet ships begin to pose a problem to our efforts to recover the *Atlantis*."

At six in the morning, Red was at Mataveri Aerodrome, supervising the attachment of the tow tug to the nose landing gear of the *Atlantis*. He'd already instructed the satellite communications ground station team to begin setting up on a corner of the ramp below the control tower. He wanted to get communications with Houston as rapidly as possible.

It was no easy job to tow the *Atlantis* backward down the long, narrow asphalt runway. It took experienced hands at the controls of the tug . . . and the tug driver was experienced from similar situations at the Cape. However, the Cape's runway was wider. Therefore, it was nearly 8:30 AM before they'd gotten the *Atlantis* moved more than halfway back along the runway.

At that point, Captain Ernesto Obregón wheeled up in his jeep. He looked at what was going on, said nothing about it, then offered Red a ride to his quarters for the scheduled planning conference. Red glanced at his watch, realized it was almost time for the meeting, and accepted the military governor's offer.

As they drove off down the runway, Obregón said firmly, "You've moved the *Atlantis* without my permission, Señor Richardson."

This remark surprised Red. "What the hell, Governor? We've got to get it off the runway. You know that's the first order of business."

Obregon nodded. "Indeed I do. But

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I don't know where we're going to put it. And I notice that you've instructed the satellite ground station crew to begin erection of the station next to the control tower. I'll stop there on our way so that you can tell them to cease work immediately."

"Governor, we've got to get our communications link established . . . and the quicker the better," Red complained.

Obregón brought the jeep to a halt alongside the runway, set the parking brake, and turned in the driver's seat to face Red. "Señor Richardson, apparently I didn't make myself clear last night. I'm the military governor of Isla de Pascua. I'm in charge of the island, and I'm responsible for what happens here." The Chilean's command of colloquial American English was fluent, which was an important element right then because he was trying very hard to communicate with this job-dominated American.

"I know that."

"There's very little room on the two ramps available," Obregón told him. "I want to know where you intend to locate various pieces of equipment and where you intend to park aircraft. I must insure that there'll be room available for the regular LAN-Chile flights. In addition, I have a government commission coming in here later today to inspect the *Atlantis* and her cargo. I thought I'd made it abundantly clear last night that nothing was to be done this morning until we'd had our meeting . . ."

"I saw no need to wait to clear your runway . . . or to set up the ground station . . ."

"There is indeed a need to wait."

"Oh? Why?"

"Because I believe there is a need, and I'm the highest military and civil authority on this island."

"You mean I've got to come to you before I do *anything?*"

"No, not once we've discussed what you intend to do and after it meets with my approval," Obregón said simply.

Red was not accustomed to dealing diplomatically with people other than Americans. He immediately saw this conversation as a confrontation between himself and Obregón for control of the recovery of the *Atlantis*, and he reacted accordingly. "Governor, you may be head honcho on this island, but I'm in charge of recovering the *Atlantis* . . . and I'm responsible to my superiors back in the United States . . ."

"Understood. But, in the meantime, you're on Chilean soil, and this isn't the United States of America. *I am the government here!* Señor Richardson, I've no desire to run your operation, but I cannot and will not permit you to run it as you see fit without regard to some of the unique characteristics of this island and the way people live here—factors that probably aren't apparent to you but which are of utmost importance to me. Therefore, to eliminate problems and to prevent troubles, you must check with me first," the military governor told him flatly. "I don't want to be like a little tin god, but you *must* cooperate with me and I *must* know what's going on. You and your people will be gone from Pascua in two months or less, but I'll be here for several more years. I'll have to deal with the legacy you leave."

"I don't get it."

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"Let me put it bluntly, then: I'll not permit you Americans to come in and take over Isla de Pascua, doing what you please, putting your equipment where you wish, setting up your living facilities where both water and sanitation may cause problems for the rest of us on this island, and generally using this island for your immediate needs regardless of the long-range changes you may be creating," Obregón explained firmly.

"Oh, so you want an environmental impact statement, then?"

"I'm not certain what that is."

"Never mind. American bureaucratic terminology. I don't want to create any long-term changes, either. I just want to get the *Atlantis* out of here as quickly as possible. King didn't land here deliberately; it was a pure emergency . . ."

"I realize the landing of the *Atlantis* happened purely by chance. But it's already creating problems on the island. I know there will inevitably be other problems while you and your people are here. I want to ensure that the two of us will be able to work out the problems together. And, when you finally do leave, I want this island to suffer as little as possible as a result of your being here. I have to live and govern on an isolated island with one airplane a week and one ship a year. I can't call for help to get me out of a bind on Pascua as a result of a problem you've left behind. I have to deal with problems with practically no help, which is why I can't let you come in and do as you please. You could, with the best of intentions and no malice involved, cause problems that I couldn't solve."

"Okay, Governor, I understand what you're trying to tell me," Red replied. "But you and your government are getting a hell of a lot of expensive equipment from us for free in this deal. You'll end up with a ground station to put you in touch with the rest of the world via satellite, plus additional electrical generating capability, plus an improved water and sewage system, plus an improved airport. Don't tell me those things are going to create problems for you."

"Yes, some of them will. This island and its people have been totally isolated from the rest of the world for longer than they can remember," Obregón pointed out. "The coming of the LAN-Chile jets ended a lot of our isolation, and the coming of your communications satellite ground station will probably complete our transition from being the island at the end of the world to a place that's just another island . . ."

"Governor, are you afraid to let the Pascuans know how the rest of the world lives and thinks?"

"To some extent, yes, because I'm not at all certain—knowing the Pascuans—that they can handle the shock of the final ending of their isolation. And I'm ill-equipped to handle it."

Red shook his head because he was in beyond his depth. "Governor. I'm just an engineer who's been given a damned difficult job getting an expensive piece of space hardware out of a place where nobody ever thought it would ever land. I can't do anything about some of the problems you're going to have because the *Atlantis* landed here. But if I have to work with you as the local government in order to

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get my job done, I'll do it. I don't have to like it, but I'll do it. But you've got to understand something, too . . ."

"And that is?" Obregón asked.

"You went to school in America, and you said you understand the American obsession with getting a job done. Okay, I've got a job to do here. The quicker I get it done, the less problem for you in the long run. I'll cooperate with you until the minute you try to slow me down with any *mañana* crap. If I run into any of that, we'll find out who's the meaner and nastier. I'm not going to worry about it."

"You have my word that I'll neither cause nor tolerate any delays that can be avoided." Obregón thought for a moment before continuing, "And, Señor Richardson, I'll do my best to avoid another eyeball-to-eyeball confrontation if you will. If it comes to that, please remember that I am the *military* governor of Isla de Pascua with all of the capabilities the title implies . . ."

"I . . . think I understand you, Governor. Sometimes I have to do a job under conditions that aren't to my exact liking, but that's the way the game is played. Okay, I'll play ball if I know what the rules are."

It hadn't been diplomatic, and it hadn't been exactly according to protocol or the way Obregón was used to making agreements. Carefully, the military governor replied, "I'm not at all certain that I do . . . completely. I'm not even sure that we really understand one another or that we do or can agree. But it's enough for a start. Let's get to our meeting. The others will be waiting."

CHAPTER TEN

There was hardly room for everyone in the office of the military governor. Obregón had spread a large topographical map of Isla de Pascua on the table. Crowded around that table were the Shuttle crew—including Hap Hazard, who was looking a little wan but was on his feet again nonetheless and refused to miss this meeting—along with Joyce Fisher, Red Richardson, Casey Laskewitz, Father Francisco, José Hey, and Doctor Esteban.

"Okay, here's what I'd like to do," Red started it off once Obregón nodded at him. "I'll get the *Atlantis* clear of the runway this morning and park it temporarily here on the south ramp . . . if that's all right, Governor."

Obregón nodded.

Red went on, "But I can't bring in C-5 Galaxy transports until I get turnarounds built at both ends of the runway; a C-5 Galaxy can't turn around on a thirty-meter runway. So I'm sending all three C-130's back to Santiago to pick up as much of the construction equipment as they can carry. The fourth Herk arrived there yesterday with additional equipment aboard. My first priority is to build those turnarounds. Governor, any problem with building them about two hundred meters square on both sides of the runway ends?"

"I don't believe so," Obregón admitted. "But how are you going to feed and house the people you're bringing in until you get the tent city set up? It seems to me you've got a basic problem of not being able to do one thing without doing the other."

"I'll do it with C-130 Herks. It'll take longer with Herks, but I'll run them

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back and forth between here and Santiago bringing in as much of the tent city and the other facilities as they can carry on each trip in addition to construction equipment and workers. When I get enough of the tent city put up, then I can bring more construction workers. And once I get the turnarounds built, I can really haul stuff in here—a hundred tons or more at a crack in a single C-5 Galaxy. Joyce, has the Embassy arranged for the Chilean contractors . . . and are they standing by for airlift?"

"When we left Santiago, our *chargé* was making those arrangements," Joyce replied, "but until we get good communications with them—perhaps later today when the ground station's set up—I can't give you an answer to that question, Red."

"Okay, but please let me know when you find out because the rest of my operation depends on those construction crews," Red told her. He turned to Obregón. "Governor, I'm going to run out of ramp area at Mataveri very quickly, so I'll have to lay more asphalt ramps. Can I extend both parking ramps out to the runway as well as to the northwest where they'll become part of the turnarounds? Is it going to disturb anything to have those ramps extended?"

Obregón and Father Francisco both leaned over the map and peered at the pencil lines Richardson had sketched.

"It will make the north ramp very close to Hangaroa," the priest said.

"Any problem, Father?" Red asked.

"No, not on a temporary basis."

"Will it affect any archaeological areas?" Joyce Fisher asked diplomatically.

"Probably," Doctor Esteban observed. "The whole island is an archaeological area."

Casey pointed out, "Why not build the ramps and turnarounds on a temporary basis so you can tear them up and restore everything once we get the *Atlantis* out of here?"

"Good idea," Joyce remarked. "Can it be done, Red?"

"Yeah, it'll mean keeping the airlift operating for a few more days after I get the *Atlantis* out." This whole operation was already costing a small fortune, Red thought. What difference would another couple of days make at this point if it would restore the island to more or less the same condition it was in when the *Atlantis* had landed and if it would keep the Chileans and the Pascuans happy?

"Where had you considered putting your living facilities?" Obregón wanted to know.

"Governor, it's going to be a city consisting of about forty United States Army tents in order to house a hundred and fifty people." Red explained. "Since I haven't got time to drill test wells for water, I'm flying in a small desalinization plant. It'll be located near the tent city with a pipeline drawing ocean water to the site. I'll be flying in our own food. Electricity will be provided by three ten-kilowatt gas turbine generator units parked where convenient. The big problem's waste disposal; if I have to, I'll put it all in honey tanks and ship it back to Santiago for ultimate disposal."

"Could the sewage be treated for use as a fertilizer here on Pascua?" Doctor Esteban asked.

"If you're short of fertilizer, why

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not? But the supply won't last forever, only until we get the *Atlantis* and the extra people off the island," Red pointed out.

"I was thinking of installing it for the use of Hangaroa residents afterwards," the doctor explained.

"Why not? It belongs to you," Joyce pointed out. "The same holds true of the electrical generators, if you can fly enough turbine fuel in here to keep them running. And the sea water desalinization plant will be yours, too."

"We will use it all," Esteban remarked. "We need modern facilities."

"Spares?" The single word came from Obregón.

Joyce sighed. "And maintenance. Come see me after the meeting, Your Excellency. We'll iron out those details."

Obregón had obviously been trained well in military as well as naval technology because he remarked, "Your tent city will require adequate drainage, even though this isn't the rainy season. However, it's best not to take chances. I'd suggest locating it here on the southwest slopes of Mount Ororito just off the runway. There's a narrow road leading into that area, and you can pump sea water from Ovahi, which is less than two kilometers from the site."

Red jabbed at the map with the pencil. "Okay, that's where the tent city goes. I'll have part of it here by tomorrow night. Now: communications. I'd like to set up the satellite ground station somewhere near the control tower and radio shack where I started to early this morning."

Obregón shook his head. "We can't provide you with any electricity. Our radios and other facilities have taxed our generating equipment almost to its limits."

"How about on a temporary basis for two days until I can get another turbine generating plant here?" Red asked.

"It'll be difficult . . . but we can do it."

"Thank you. Now, I'll have to pour some concrete pads for the stiffleg derrick so I can eventually lift the *Atlantis* aboard NASA Nine-Oh-Five, plus some smaller pads for the tag line masts. Where do you want some nice concrete pads for future use, Governor?"

"How big are they and what do they look like?" Obregón wanted to know.

Richardson drew out a set of blueprints, and the military governor studied them for a moment. "Can you put the mating facility out here on the ramp northwest of the control tower where you'll extend the ramp? We'll put some buildings on those pads later," Obregon suggested.

"No problem, Governor. I'm happy to put anything anywhere you want me to as long as it doesn't conflict with getting the job done." Richardson rolled up the drawings. "That covers most of the big problems. What else?"

"Has the Chilean inspection commission and the press plane taken off from Santiago yet?" Joyce asked.

"No. They won't leave until they receive word that the runway's clear here," Obregón remarked.

"Then please delay them until tomorrow," Joyce said.

"Tomorrow? Why?" Obregón asked.

"How many people are on that Pan Am charter? Casey, how many press people?"

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"I don't have an exact head count. No communications."

"Your Excellency, how many members of the commission and their staff?"

Obregón shook his head, indicating he didn't know either.

"All right, to get an estimate, how many people can a Boeing Seven-Oh-Seven carry?"

"About a hundred and ninety," Jackie Hart volunteered. "I used to fly 707-331's for TWA before I joined NASA."

"Let's assume it isn't quite full," Joyce went on. "How can we handle another hundred and fifty people on this island tonight without the tent city set up and operating? We're already three and four to a room in the hotel."

"You're right, Joyce. The media gang will scream bloody murder if they don't have what they consider 'civilized' facilities. We can't doss them down with blankets under the stars," Casey said in agreement. "Hold that Pan Am charter, Governor."

"I can certainly ask the commission to delay their departure under these conditions," Obregón observed. "No problem there."

"What sort of excuse can we give the media people?"

"Simple: no room on the island for them," Casey replied, then looked at Father Francisco with a grin and added, "Or to make some of these news media people feel that we're treating them in accordance with their own evaluation of their importance—pardon my blasphemy, Father—we could tell them there's no room at the inn . . ."

To everyone's surprise, it was Father Francisco who roared with laughter. Then the crew of the *Atlantis*—each of whom had had their own trials and tribulations with members of the Fourth Estate—joined him.

When the room had quieted down, Obregón told all of them, "We have a few more matters to settle. First of all, I'm told by Santiago that you'll use Pascuan workers wherever possible, Señor Richardson."

"That's what I'm told, Governor."

"Let me know how many workers you need, how long you'll need them, and if you require any special skills," Obregón went on. "The size and duration of this job is such that I won't issue daily permits to leave Hangaroa, although I'll require that workers return to the village when their shift is over."

"What's this?" Red was rather astounded at the military governor's apparent reference to absolute control over the Pascuans. "Exit permits from the village?"

"The Pascuans aren't allowed to leave Hangaroa without a written permit from me." Obregón announced and quickly held up his hand to stem the tide of voices that immediately began to arise. "Before you ask why, let me explain. The Pascuans have no concept of property. Therefore, they'll take anything that catches their fancy. All of them are thieves. Isla de Pascua's a sheep-raising station for the Armada de Chile, and, in spite of everything we do, the Pascuans manage to steal several hundred sheep every year. So I must control them. Señor Richardson, you'll detain and turn over to my military police any Pascuan you find who doesn't carry a permit from me. Understood?"

Red nodded. This was going to be even more difficult than he'd antici-

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pated. And it was making him a little bit angry at this military governor.

Father Francisco added, "Please do not think harshly of the governor. He is correct. In spite of the attempts at teaching the Pascuans by my predecessors and myself, it is true that they have no concept of property. Therefore, they cannot help but be thieves according to our definition."

"Our language," José Hey put in, "does not have a word for personal possessions. I feel badly that my people are considered to be thieves. Perhaps someday the old language and the old ways will pass . . . and we will change."

"Maybe," Casey said quietly, "what you and your people learn from satellites will help."

"Three other absolute requirements," Obregón went on. "None of your people is to give the Pascuans any of your alcoholic beverages. They have their own drinks that serve them well . . ."

"And we'd better be careful of *those*, good buddies," Hap Hazard reminded them. "They can knock you right on your can."

"As I explained to Frank King," the governor continued, "there will be no fraternization between your people and the Pascuan women. He can explain why to you at a later time. There're many reasons, but the first one is that it can lead to trouble between your people and the Pascuans."

"I'll do my best, Governor," Red commented. "but some of those workers assigned to me are Chilean . . . and I don't know if I can enforce that prohibition with them or not. I'm not even sure who's responsible for them to you. As a matter of fact, I don't even have enough control over the NASA and Air Force people to prevent them from sneaking off in the middle of the night . . ."

"Simply tell them, Red, that if they're caught and they aren't shipped off to jail in Santiago, they'll be sent home at once and probably suspended," Joyce said.

"Okay, I'll tell them I'll try to come see them on visiting days," Red said. "What's the third hooker, Governor?"

"Simply a reminder of what I said previously: Guard your property and equipment . . . or it'll turn up missing very quickly."

Frank coughed and looked at Jackie, Hap, and Lew. They'd found new shoes now which, although not NASA flight boots, were at least shoes to protect their feet.

Casey knew of the incident, but hadn't said anything about it to either Alice or Herb. He could visualize the stories about the Barefoot Astronauts on the South Sea Island. As it was, both Alice and Herb had noted in their initial reports—both still waiting for transmission to their respective news services—that Lew had greeted them barefooted.

"If any of your people get dysentery," Doctor Esteban added, "please let me know immediately. You can reduce the possibility of getting it by not drinking any Pascuan milk products. There should not be any trouble with meats or vegetables that are well-cooked. You will have your own food, so that will eliminate a great deal of potential trouble. However, there are many bacteria that cause dysentery, and you will

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probably have some people who are susceptible. With so many people coming to this island, we will have to be very careful about public health measures. It is not unknown to have cholera epidemics in this part of the world, and leprosy is still a problem because the specifics to treat it are not yet generally available. I will continue to inspect all incoming airplanes for public health purposes. Beyond that, please consider that my modest medical facilities are available if needed."

"Thanks, we'll keep that in mind," Red told the island's doctor. "Let me know what drugs and other pharmaceutical items you'd like to have on hand to handle about a hundred-fifty visitors, and I'll get them flown in."

Red turned and said to Frank, "Since we're short of accommodations here, you and the crew climb aboard the first Herk to leave and get yourself back to Houston. After all, we're short of flight crews and . . ."

Both Obregón and Esteban raised their voices together, then the doctor deferred to the military governor.

"I'm afraid the crew of the *Atlantis* can't leave Isla de Pascua," Obregón stated.

Frank kept quiet. This was news to him. Joyce started to say something, but Red broke in, "Well, why not, Governor? We're short of accommodations here, and that'll mean four fewer people to feed and sleep . . ."

"The inspection commission may want to speak with them," Obregón explained carefully.

"Has the commission specifically requested this?" Joyce asked.

"No, but as military governor I shouldn't permit them to leave Pascua until the commission clears their exit," the officer said. "They were the ones who landed the *Atlantis* here. If I were to allow them to leave and thereby become unavailable for the commission to talk to, I'd be quite derelict in my duty."

"You're right, Your Excellency," Joyce admitted.

"If you're not permitting the crew to leave, are you interning them, Governor?" Red's tone was defensive.

Obregón shook his head. "Of course not. But they should be available for the commission to question concerning the landing. If I let them go, they'd probably be detained in Santiago and sent back here."

"Look, Governor, they're an expensively trained space flight crew. NASA can't afford to have them sit down here on Pascua doing nothing," Red continued to object. "We're desperately short of flight crews. I've got to get them back to Houston because of that reason alone. In addition, there are engineers waiting in Houston to de-brief them so we can find out exactly what went wrong. It's just as important that the crew gets back quickly as it is for the *Atlantis* to be returned."

Obregón looked sternly at Richardson who was at least a head taller than the Chilean naval officer. With an edge on his voice, he said, "Mister Richardson, I will not permit the crew of the *Atlantis* to leave Isla de Pascua until the commission tells me that I may."

"You just said you're not interning the crew. Well, I'd like to know exactly what you *are* doing to them, Governor," Red exploded. "You have, in

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effect, imprisoned them here on this island. Well, they're all American citizens; I brought you their passports. As American citizens, they can come and go as they damned well want to! How about the rest of us? Are we going to have to get your permission to leave, too? In fact, are you going to require us to get permits from you to leave the hotel or the tent city every day . . . like you do for the natives under your control?''

''Excuse me, Your Excellency,'' Joyce broke in. ''May I speak with Red and the crew of the *Atlantis* in private for a moment?''

''Of course. And I think you'd better.''

Joyce beckoned the crew of the *Atlantis* and Casey to join them and led them outside.

Once to themselves, she lit into Red Richardson. ''Look, Red, I don't know what's between you and Obregón, but you've got to realize that he's Lord High Everything on this island.''

''He's already told me that in no uncertain terms,'' Red fired back. ''But who's running this show? Do I have to ask him for a permit every time I need to go to the bathroom?''

''No, but when he says you can or can't do something, you'd better not argue with him,'' she told him firmly.

''So what do I do? Let *you* hold my hand instead?''

''Precisely. That's what I'm here for. You may be a good manager for NASA, Red, but the techniques you use to get things done in Houston are not—repeat, *not*—the techniques that'll get the job done here.''

''Well, I'm not going to let this little tin god stand in the way of getting the job done, and I've told him as much.''

''Oh, you have, have you? Ever seen the inside of a jail in any South American country?''

''What's that got to do with it?''

''You may get the chance. Obregón has the full power to put you in the slammer for any reason he deems suitable,'' Joyce snapped. ''You're not on American soil now. You're not subject to American laws. If you or anybody else on the recovery team gets in trouble with Obregón, there isn't *anything* the State Department can legally do to help you. Do you understand that, Red?''

''Aw, hell, do you mean to tell me my employer isn't going to stick by me and protect me?''

''The United States government *can't*.'' She sighed. ''Granted, I'd go to bat with Obregón and get in touch with people I know in Santiago. We'd get you or your people released. But, Red, I'm going to have enough problems without doing that, too. So don't get the idea you're immune to Chilean law and the authority of Governor Ernesto Obregón just because I'm here to bail you out. I just might decide to let you stay in stir a couple of days to learn your lesson. Understand?''

''Okay, yeah, I understand. So you want me to work through you with Obregón?'' the NASA mission manager wanted to know.

''In the meantime until we get things running smoothly, yes, please do so,'' Joyce said.

Frank spoke up, ''Red, you've just gotten off on the wrong foot with Obregón. He isn't such a bad guy. If you think of him as you would anybody

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from the Air Force or the Navy who's working with NASA, you'll find he's mellow."

Red looked at the shuttle pilot. "I sensed there was a bond of friendship between you and Obregón, Frank."

"Yeah, there is. Don't ask me why, but there is," Frank answered.

"Come to think of it, it wasn't such a sharp idea to send any of you back to Houston right away," Red admitted. "Frank, we can use your friendly relationship with Obregón. I'd like you to stick around and work with Joyce here." Richardson's quick, impetuous, redhead's anger evaporated as quickly as it had sprung up once he started thinking about the details of getting his job accomplished again.

"Why not? This is going to be interesting," Frank admitted.

"The same goes for the rest of you," Red said to the other three crew members. "Hap, you're probably not feeling well enough yet to travel, are you?"

"Not really, Red," the payload specialist told him. "Besides, that baby in the payload bay is my responsibility. I know it inside and out. I'd really like to stick around in case you need somebody who knows the Landsat . . . and you might, depending on what the Chilean commission decides to do."

"I'd like you to take them through the payload bay, Hap."

"No problem. I'd planned to."

"How about you, Jackie? You can stick around and help out, or you can go once Obregón says so. I wasn't thinking when I said something about the shortage of flight crews. With the *Atlantis* on the deck here, we're not short of flight crews; we're short of Orbiters," Red said.

"I'll stick," Jackie said. "Casey's going to need help with that bitch Arnold . . . and I can handle her because I can be bitchier."

"Aw, don't approach it that way, Jackie," Casey put in with a pleading tone. "I'd much prefer it if you'd figure out a way to get along with her. After all, you're the prime female interest in this news story, kid."

Jackie thought a moment. "You're right," she said simply. And she also told herself that a lot of press coverage from Pascua wouldn't hurt her a bit when it came to bucking for that pilot's rating with Duke Kellogg. In fact, a lot of good media exposure might be just the thing to get her over the final hump of admission into the select club of scheduled shuttle pilots.

"Lew?"

The ex-Navy fighter jock grinned. "Ever know a brown-shoe Navy type to turn down what amounts to a long liberty on a South Pacific island, Red? Just give me a cot in a tent where I can throw the body occasionally, and I'll be a happy and helpful staff man. Matter of fact, I'm the world's best supervisor, and I figure you've got a lot of jobs to do . . . and Every Job Needs A Supervisor."

"You're on."

"Okay, Red, have we got it square now?" Joyce wanted to know.

"Yeah. No problem, Joyce, once I know what the score is. I was working under the assumption I was supposed to run the whole show," Red admitted. "Now I realize it's got to be a team effort, so that's the way I'll operate. No

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skin off my nose. In fact, it's a load off my shoulders because now I can worry only about keeping Duke Kellogg happy and getting the *Atlantis* on top of Nine-Oh-Five and out of here. However . . ." He paused for a moment and then went on, "I strongly suggest we try to get our heads together at least daily . . . maybe at breakfast." He nodded at each as he spoke. "Joyce, of course, so she can handle the diplomacy involved. Frank, because you've gotten close to Obregón. Casey, because you're handling the damned press and can keep them out of my hair. And any of the rest of you that care to get up that early. We'll iron out sticky problems, get assignments and responsibilities straightened out, and yell at each other. Only way to get a big project done."

"You must have a difficult time in NASA," Joyce observed.

"Yeah, I do. And from what I know of everybody here, we all do," Red said, a note of disgust creeping into his voice. "None of us would be standing here now if we weren't the kind who gets the job done, regardless of what the book says about doing it."

Frank growled, "If I'd followed the book, I'd have been dead years ago!"

"And the current book doesn't lead toward a permanent presence in space," Casey muttered.

"Amen to that, brother!" Lew put the cap on it.

Joyce looked at each of them. "Jackie, how do you manage to put up with this bunch of wild-eyed, impractical dreamers?"

"Easy," Jackie Hart snapped. "I'm a dreamer, too."

"Trouble with you dreamers," Red observed, "is that somebody has to turn the dreams into reality. Now can we get back into that meeting and proceed to get the *Atlantis* off Easter Island and back into space some day?"

When they returned to the meeting room, Joyce said something in Spanish to Ernesto Obregón, who smiled and replied to her. Whatever it was, Red decided, it was of a diplomatic nature and he wasn't going to worry about that any more. The diplomatic protocol was in Joyce Fisher's hands now, insofar as he was concerned . . . and he was content to leave it that way.

There wasn't anything left to discuss, so the meeting broke up. They all took the short walk up the hill to the airfield while Obregón and Red drove the jeep down the runway to where the *Atlantis* sat, waiting to be towed. The Herk crews were sitting or lying on the ramp in the shade of the wings of their aircraft. The place had an air of expectant waiting.

It didn't last once Red got on the site.

The GE people got busy setting up the ground station. Early in the afternoon, they completed their tests and were linked in with the telecommunications network of the United States through a Westar satellite in geosynchronous orbit. Suddenly, Isla de Pascua had two voice channels, a teletype channel, and two television channels linking them with the rest of the world on the low-noise, high-reliability basis that only satellite communications can provide.

The Herks took off for Santiago after refuelling from the tanker Herk. And Red Richardson sat down in the ground station trailer and began to work with

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Houston again.

He found himself talking with another world. He realized only then what less than twenty-four hours disconnected from the rest of the world on Isla de Pascua had done to him.

Duke Kellogg took over the phone from Joe Marvin. "What took so long getting the ground station set up?" Kellogg wanted to know. "We've been standing by here for more than a day. What's the reason for the delay, Red?"

"Well, we sure as hell haven't been lying in the sun on the beach," Red told him. "Duke, we got the Herks in here last night, and we couldn't unload because there aren't any ramp lights. When we started to get things out of the Herks this morning, I discovered I hadn't touched second base with the military governor."

"What's that got to do with it?" Duke wanted to know.

"Protocol, Duke."

"That was supposed to be handled by State. What's the matter? The woman they sent along can't hack it?"

"Far from it. I'd be in jail without her. Joyce knows her way around," Red explained. "We had to spend a couple of hours this morning in a meeting with the governor bringing him up to speed on our plans and getting his permission on where to locate things . . ."

"Why couldn't you have done that last night, Red?"

"Because Governor Obregón wouldn't let us. Duke, this place works differently."

"Listen, Red, if you run into any of that *mañana* stuff you let me know and I'll get on the horn to the State Department . . ."

"Don't worry, it's worked out now. Has the tent city left yet?"

It didn't bother Duke Kellogg to explain to Red that it hadn't because of a red tape jam-up with both Army and Air Force.

"Duke, don't you ever say one damned word to me again about any *mañana* stuff down here," Red growled. "I can't bring in the Chilean commission or the press until I get that tent city and all its facilities . . . and I don't know how long Obregón can keep that commission cooling its heels in Santiago."

Joyce, who'd been listening on another headset, remarked, "This is Joyce Fisher from State. Sorry, but I've been listening to the conversation. Mister Kellogg, I'll talk to my boss at State about this as soon as I can get through to him. If the Chileans think that we're trying to delay the arrival of their commission, they could get nasty . . . and we're sitting down here on Chilean soil." She also had come to the conclusion that if the Chilean commission was delayed too long, the Soviets would certainly redouble their efforts in the Security Council for a full-dress UN commission . . . and that would delay the recovery of the *Atlantis* for weeks or even months.

"I'm serious, Duke," Red broke in. "We've got to have those living facilities here . . . and fast! You don't realize it but there isn't even room here on Pascua for the people that're already down here on the recovery mission, much less the others we've got to bring in yet."

"Okay, we'll figure out something."

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Like hell! Red told himself. If it isn't in the book Duke won't know what to do. So Red would work it out with Joe Marvin, and they'd ram it through and cover it with paperwork later.

Joyce got the other voice channel set up to connect her with Alfred M. Dewey in Washington. While Red continued to work with Houston on the mundane technical details of the airlift, she finally reached her boss.

"Thank Heaven I've got contact with you again," Dewey's voice was relieved. "I hope you've got things under control there because everything's breaking loose up here."

"The only problem we've got is housing for the Chilean inspection commission, Mister Dewey," she told him. "Otherwise, we've worked out all the protocol and arrangements with the military governor—his name is Captain Ernesto Guillermo Obregón, by the way, and he was educated in the States—and everything's running along smoothly on that front. By the way, it's Obregón who's delaying the Chilean commission in Santiago, not me. It's a fact, Mister Dewey: there's no place to put them if they try to come to Pascua right now."

"No accommodations? That's hard to believe."

"You'd have trouble believing this place," she told him. "We're stacked up three and four to a room in the little hotel, and the flight crews of the aircraft along with some of the other technicians are either sleeping in the airplanes or wherever they can find a place to stretch out."

"The Chilean *chargé* here informed me earlier today that the Chilean inspection team was only three people."

"Only *three?* Well, that's the first word we've gotten on that, Mister Dewey. I thought for certain there'd be at least a dozen, plus staff people of equal number. That's the way they usually stack the deck because it provides them with an opportunity to hand out political plums to as many people as possible. Maybe we can handle three more people."

"I don't see why not. Have NASA send the crew of the *Atlantis* home on the next plane. That'll give you room . . ."

"Governor Obregón doesn't want the crew to leave until the Chilean commission's had an opportunity to talk to them, if the commission wants to. I'm afraid they'll have to stay."

"Oh, very well. But tell the Governor the commission's only three people . . . and he may know them." Dewey repeated their names to Joyce, who wrote them down. "It's being headed up by the commander of the Chilean navy, Admiral Montero. The other members are Colonel Amaldo Ríos of the Chilean air force and their top astronautics expert, Professor José Pérez."

Not only was it possible that Obregón knew them, but Joyce knew two of them herself—Ríos and Pérez. Unlike the United States, society in many countries was rather small and cliquish, an elite group where everyone knew almost everyone else. In fact, it was somewhat that way in the United States as well, but not as open in nature as elsewhere.

Joyce was becoming a bit upset. Why hadn't they been told by the Chileans that that inspection commission was

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only three people? Had somebody withheld that information deliberately, knowing that conditions would be saturated on Pascua and that Obregón would have to request a delay on that basis? "Mister Dewey, I'll get this information to Governor Obregón immediately. It's important that this inspection commission not be delayed."

"Good. Now, I have some other information that has come to me through some reliable channels that must remain nameless at this point. And I must ask you to treat this information in a most discreet manner. You may pass it on to the military governor at your discretion. I don't know the man and I can't anticipate what his reaction might be. You're on the spot, and I'll rely on your judgement." Dewey paused, then went on, "There are two Soviet naval vessels proceeding in the general direction of Isla de Pascua. It's believed that Pascua is their destination. One of them is the *Sverdlov*, which is a guided missile cruiser. The other is the *Kharkov*, which is an aircraft carrier of the *Kiev* class with a squadron of Yak-36 Forger aircraft. The intentions of these two ships are unknown, but our analysts suspect they may show the flag in the vicinity of Pascua, rather a subtle hint by the Soviets that they don't intend to blithely accept any report from the Chilean inspection commission. They may demand to conduct their own inspection."

"But that would be an open violation of Chilean sovereignty!" Joyce pointed out.

"Yes, it would, wouldn't it? It has us worried here in Washington. We're not sure, under the circumstances, which way the Chilean government might bend . . ."

"I am." Joyce said flatly.

CHAPTER ELEVEN

Joyce, Frank, and Governor Obregón awaited the arrival of the Chilean inspection commission with some trepidation, each of them concerned in a different way.

The three of them sat in Obregón's jeep at the base of the tower where a loudspeaker had been rigged to permit broadcasting of all tower-air radio conversations. Redeemer Zero One had reported the formation of four Herks inbound at Ostra intersection as required by protocol, but it would be about a half-hour before the big four-engined craft appeared in the eastern skies of Isla de Pascua.

"You look worried, Frank," Joyce remarked.

Frank shook his head. "I'm not. I know what we've got in the *Atlantis*. But I don't know if we'll be able to explain it to them."

"They all speak English very well," Joyce told him.

"That's not it," Frank admitted. "I don't know what sort of people they are. And I can't figure out whether or not they're a hangin' jury."

"Hardly," Obregón put in quietly.

"Then why do you look worried, Ernesto?" the shuttle pilot wanted to know.

"Because I know them and because they are very powerful men in Chilean affairs . . . and because one of them is my superior officer in the Armada de Chile . . ."

"You said you knew them, Joyce.

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Who are they?'' Frank asked her.

''The commission is headed by *Almirante* Eduardo Miguel Montero, the commander-in-chief of the Armada de Chile,'' Joyce explained. ''That's why the governor's nervous. I know the other two—*Coronel* Amaldo Carlos Ríos of the Fuerza Aerea Chile, the air force, and *Profesor* José Richardo Pérez who's president of the Sociedad Interplanetaria Chilena.''

''The big guns,'' Frank observed.

Joyce nodded. ''I told you this was a sensitive situation for the government of Chile and that they'd put the biggest names in the country on the job. The small size of the commission means Chile's seriously concerned about getting a report off to their UN delegation fast in view of the movements of the Soviet vessels in the Pacific . . .''

Obregón turned quickly to her. ''You know about the Soviet ship movements?''

Joyce nodded her head. ''Yes, but I don't know whether or not it affects us, Your Excellency. The Soviet guided missile cruiser *Sverdlov* and their new aircraft carrier *Kharkov* left the Vladivostok area three days ago. I don't have any information concerning their course, but I understand it's extremely rare to find Soviet ships heading toward the South Pacific . . . ''

''It has a bearing on this situation . . . particularly if these Soviet vessels are indeed headed in this direction,'' Obregón observed. ''After all, Joyce, Isla de Pascua is Chile's western point of defense . . .''

It didn't escape Joyce's attention that the governor had addressed her familiarly by her first name, an uncharacteristic response not only in a Latin American country but in diplomatic circles as well. ''If I get more information on the matter, I'll tell you immediately, Your Excellency . . .''

Obregón looked at her, not totally unaware of her subtle sensuality. ''As I told Frank, we're going to be working together closely on Pascua for a long time. I acknowledge your fine technical education and diplomatic training along with your knowledge and understanding of my country. But, between ourselves privately, I think it'd work better if we dispensed with the protocol of titles. If you don't object, I'd like to call you Joyce. And the honorific, 'Your Excellency,' sounds terribly formal coming from such an unexpectedly attractive diplomatic representative. Ernesto would sound better. There's much to be said for the woman's liberation movement in your country.''

Joyce broke forth in a radiant smile. ''Why, thank you, Ernesto.'' Then she broke into Spanish until Frank held up his hand.

''Uh, look, a linguist I'm not,'' he pointed out.

''Sorry, we'll keep it in English,'' Joyce said.

''Thanks.''

Obregón chuckled, obviously still under stress about the coming inspection by the commission, but grateful for the momentary relief of tension. ''I think that's a workable arrangement. If I need to discuss something privately, I'll merely slip into my native language . . . whereas you can do the same by lapsing into the technical jargon of space that I can't follow at all . . .''

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"Pascua tower, Redeemer Zero One, flight of four, I have the airport in sight," came the rasping voice of the tower loudspeaker.

Four specks had appeared in the eastern sky over the cone of Mount Ororito.

Obregón got out of the jeep and smoothed his khaki uniform. "Time to get to work." A detachment of Chilean naval troops from the Pascua garrison moved into position on the ramp at Obregón's signal.

The three members of the Chilean inspection commission were the first to disembark from the first Herk to taxi up to the ramp at the base of the tower.

And both Joyce and Frank discovered that Obregón had arranged for full honors—a 19-gun salute from an old US Army 37-millimeter anti-tank gun that Obregón's contingent must have had stored somewhere for such occasions, a small drum-and-bugle group that played four ruffles and flourishes, eight uniformed side boys that lined up on either side of the Herk's forward passenger door, and a formation from the Isla de Pascua garrison.

"Full protocol," Joyce remarked aside to Frank. "That means we've got to accompany Ernesto. Come on."

Frank was impressed, and the full meaning of his emergency landing on Pascua began to dawn on him. He wished Red were present, but the NASA mission manager was off supervising the construction of the runway turnarounds. Casey was hovering in the background along with Alice Arnold and Herb Haynes, both of whom had their recorders going and their cameras clicking.

At the very last moment, he remembered that he was a civilian for all intents and purposes and suppressed the impulse to salute both the Chilean admiral and air force colonel. Instead, he simply shook their hands formally upon introduction. All three commission members gallantly kissed Joyce's hand, and Colonel Ríos and Professor Pérez greeted her familiarly in Spanish. She replied in a manner totally unlike the American woman she was.

The three commission members reviewed the honor guard with Obregón, then were led to the jeep by the military governor. Much to Frank's relief, all three men spoke good but accented English.

Admiral Montero was all business. "Governor Obregón, Señor King, let us get to the business at hand . . ."

"What is your pleasure, sir?" Obregón asked in English, taking his cue from the admiral that this was to be the official language of the occasion. "I've arranged quarters for you at the garrison because our facilities at the Hangaroa Hotel are very crowded. Would you care to be shown to your quarters first?"

"No. I am under direct orders from the president to conduct this inspection and make a full report as quickly as possible," the admiral snapped. "We wish to be taken to the *Atlantis* immediately. Señor King, is your crew available to accompany us on our inspection and to explain matters?"

"Yes, sir. They're waiting right here." He beckoned to where his three compatriots were standing by with the press contingent a few yards away, all three of them still attired in their flight coveralls, which had been washed by the hotel staff but which still looked

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wrinkled and used, their common appearance even when brand new. Carefully, he introduced Lew, Hap, and Jackie to the commission members.

Colonel Ríos was obviously highly impressed that Jackie Hart was a crew member of a space vehicle. "Are you a pilot?" he asked her.

She nodded. "I'm a fully rated Air Transport Pilot with about two thousand hours before I joined NASA," she explained.

"Then you also fly the space shuttle?"

"Someday," Jackie promised loudly for the benefit of the tape recorders of Alice and Herb.

It was a short walk across the ramp to where the *Atlantis* was parked, gleaming black and white in the noon sunlight with her name boldly in black on her sides and the words "United States" and the flag emblazoned on the fuselage near the tail. It was obvious that this Orbiter had seen many flights; there were smudges of black and brown flowing back along her fuselage where the thermal protection tiles had ablated after many atmospheric entries and deposited their heated material in the air flow along the Orbiter's surfaces. The hatch still hung horizontally open, but Obregón had allowed Red to position the LAN-Chile boarding stairs up to it so the commission wouldn't have to climb Jackie's rope ladder.

Admiral Montero looked up at the *Atlantis*, obvious admiration for her technology and capabilities revealed on his face. The first things he asked for were the ship's papers.

Frank handed over a vinyl-bound packet containing an airworthiness certificate, the registration certificate, an international cachet obtained from the National Aeronautic Association, the proper FCC radio transmitter licenses, a list of crew members with their passport numbers, and a cargo manifest. None of these had been aboard when the *Atlantis* had landed on Pascua. They'd been assembled in a panic rush when Alfred M. Dewey at the State Department had insisted; the information had been cabled to the United States Embassy in Santiago; the Embassy had prepared the necessary formal papers; and Joyce had brought them with her or they'd been flown in on the fourth Herk on the third day after landing.

Frank resolved to have a chat with somebody in headquarters about the absolute necessity of having these required international papers aboard every shuttle that flew henceforth. Obviously, in their technical drive to perfect and operate the shuttle space transportation system, a whole series of NASA managers had simply overlooked everyday international protocols . . .

Thank God we were able to put it together in a hurry and get it here before the authorities came! Frank thought as the commission carefully scrutinized the document packet. Obregón had gone out on a limb for them, but Joyce had managed to save his neck . . . as well as those of the crew of the *Atlantis*.

The commission chatted together in Spanish as they went through the packet, nodding their heads as they looked over each document. Finally, Admiral Montero remarked, "All the papers appear to be in order. Captain, do you have the passports of the crew?"

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Obregón nodded.

"I presume they have the proper visas?"

"Since their landing on Isla de Pascua was an emergency I used my authority as governor to grant them visas of sixty days' duration," Obregón added quietly. "Their personal documents are in order, sir, and you may view their passports and visas in my office at your convenience if you wish."

"Later perhaps if we deem it necessary," the Admiral replied curtly. "Señor King, because of the . . . unusual nature of your flight, we have been charged by the President of Chile to inspect your space craft to insure that the cargo manifest is correct. Do you have any objection?"

"Not at all, Admiral," Frank replied easily. "As a matter of fact, it would be my privilege as commander of the *Atlantis* to escort you on a tour of the ship. Since you're interested in the payload, Mr. Hazard here will accompany us because he's the mission's payload specialist directly responsible for Landsat-XIII."

There'd been no mention made of the Soviet claim. However, Montero went on to ask, "How can we know that the payload is Landsat-XIII as the ship's documents claim?"

Professor Pérez said, "Admiral, I know a Landsat when I see one. I have the documents from NASA. We've built a ground station to receive the Landsat transmissions at the University in Santiago."

"Well, then," Frank said, indicating the LAN-Chile boarding stairs leading to the open hatch of the *Atlantis*, "welcome aboard. If each of you will take a flashlight from the Governor, we'll go aboard. There's no electric power in the ship because everything's been shut down, so it's dark inside. Please watch your heads because the *Atlantis* isn't designed as a passenger transport. It's a space truck . . ."

"Would it be easier for you to open the cargo bay doors and let us look directly at the cargo?" Colonel Ríos wanted to know.

Frank shook his head. "As Professor Pérez must know, to save weight the doors were designed and built to be opened only in the weightlessness of orbit. It takes special equipment to open them on the ground . . . and that equipment's in the United States. We'll just have to take you into the payload bay itself . . ."

It wasn't a comfortable tour, but crawling around inside a space shuttle orbiter on the ground isn't supposed to be comfortable. Frank remarked that there was a lot more room in the weightlessness of orbit. The first order of business was the huge, dark payload bay. Admiral Montero had some trouble negotiating his portly form through the restricted openings of the airlock hatches. Both Colonel Ríos and Professor Pérez were younger men and found the going much easier.

There really wasn't too much to see in the payload bay. It was quiet, dark, and surprisingly cool inside because of both the insulation of the tiles on the external surface of the *Atlantis* and its greyish-white color exposed to the sun. There were four Quick Getaway Specials bolted to the side of the bay forward, and the rest of the huge space 15 feet in diameter and 60 feet long was

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empty, filled only in the middle by Landsat-XIII in its cradle, its iridescent blue solar panels folded around its spindly tubular frame. Montero obviously didn't know what he was looking at. Ríos, on the other hand, didn't either but was looking for military payloads. Pérez knew what a Landsat looked like and spent considerable time with his flashlight inspecting what he could see of the satellite. Although it was somewhat difficult to see into the payload bay behind the Landsat, both Ríos and Pérez shone their flashlights carefully into every nook and cranny they could.

Frank and Hap didn't try to rush them. The object of the inspection was, after all, to let this Chilean group see for themselves that there was only a Landsat aboard, not a military satellite and definitely not an orbital beam weapon system . . . although Frank wondered how they'd be able to recognize such a highly classified object as a particle beam weapon. He'd seen only two highly classified Top Secret photos of such a satellite.

Hap was very good at answering their questions in simple terminology. Frank thought the man would have made a very good teacher. But it was Hap's natural enthusiasm for space and its potential that got through, especially to Professor Pérez and to a lesser extent to Colonel Ríos. It was obvious that Admiral Montero knew little of space technology and had been appointed as head of the commission because of his position as the admiral commanding the Armada de Chile . . . and probably because of his political clout and family reputation as well. Or, Frank thought, it might be that Montero was aiming for or was under consideration for a higher position in the still-influential military junta that was officially no longer in power . . . but probably still had plenty to say about running Chile.

However, all three of the commission were more attentive and interested when Frank took them up to the flight deck, showed them the controls for unloading the Landsat with the payload arm, and let each of them sit in the pilot's seat. Back down on the mid-deck, he and Hap showed them the living accommodations for the crew in orbit. Admiral Montero had probably had some sea duty because he was most interested in the compact manner in which the life support consumables were prepared and stored on the mid-deck.

The commission was reluctant to leave the *Atlantis*. After all, it wasn't often they'd had the opportunity to be aboard a space ship. Montero finally said, "I believe we have seen enough here for now. We may wish to come back aboard later."

"No problem," Frank told him. "As I've said, we have nothing to hide. This is strictly a civilian operation with no military implications whatsoever."

"That, Señor, is what we are here to confirm," the admiral reminded him. "It's well past time for lunch, and I'd like to have the opportunity to talk to you and your crew during the meal if you'll join us." The head of the Armada de Chile was still a diplomat even under the obvious pressure being applied to his government by the Soviet Union. *La dignidad del hombre* ran deep in this culture, Frank decided. There were obviously strong class distinctions, and it was equally obvious that Frank and his

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crew were being afforded the distinction of being members of the ruling group, not because they were Americans and not because the commission probably already knew that both Frank and Lew were military men, but because the crew of the *Atlantis* was a new type of people that didn't yet fit into the old classifications of the culture . . . and they were therefore being treated as first class unless they proved themselves to be otherwise.

Frank hoped that Lew's training as a naval officer would prevail over his normal fighter-jock personality. He wasn't worried about Hap; the payload specialist was so enthusiastic about his job and space that he had an almost puppylike affability. It was Jackie with her rough-and-ready approach to the world of male domination who worried him most.

It shouldn't have. During the spartan meal in Obregón's quarters, Jackie behaved herself. In fact, she turned out to be charming to the three Chileans, who treated her with great respect and deference. For once in her life, Jackie wasn't on the defensive; she was being treated as she thought she should be treated, and she wasn't competing directly with men. Instead, these three Chileans softened her up like hot butter, Frank realized . . . and he got a whole new handle on Jackie Hart's personality.

The meal was long and leisurely, lasting well into the afternoon. Most of the conversation took place between the crew and Colonel Ríos and Professor Pérez. Ríos had been trained as a pilot at Williams Air Force Base in Arizona, as had Frank; they had much in common to talk about. Pérez, on the other hand, was very conversant with space technology, had been in the United States often, and knew a great many American space scientists and engineers associated with the International Astronautical Federation, whose annual congresses he'd attended.

It was only after several hours had passed that Frank came to the realization that these suave Chileans were in fact grilling the crew of the *Atlantis* in a very thorough but unobtrusive manner. Through the skillful use of conversation, they'd drawn a great deal out of the normally friendly and gregarious Americans. It was only Colonel Ríos that seemed to be probing and suspicious.

"Why is the payload bay not full, Colonel King?" the Chilean air force officer asked, deliberately using Frank's military title.

"Colonel, the *Atlantis* will carry more than thirty-five tons into Earth orbit if it's launched toward the east to take advantage of the Earth's rotation," he explained carefully. "But when we have to launch into an orbit that goes over the Earth's poles, we can't take advantage of that additional velocity. So we have to run the *Atlantis* with less payload than she's capable of carrying. Do you fly your C-131's with all the cargo they'll carry if you have to make a long haul—like from Santiago to Pascua, for example? The same trade-off holds for the *Atlantis*. We traded off payload weight for additional velocity. Our orbiter's running light. That's why most of the payload bay's empty . . ."

"Why did you launch from a military facility?" Ríos persisted.

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"Because of safety precautions. Going south out of Vandenberg means there're no people under the flight path until orbit's achieved."

"But isn't it possible to launch to the south from Cape Canaveral?"

"Not without flying over the heads of people during a critical portion of the mission. Space flight isn't yet as safe and reliable as aviation . . . as our emergency landing on Pascua proves."

"I am merely wondering, Colonel, why the United States launched a civilian Landsat mission from a military rocket base," Colonel Ríos went on.

"Colonel, as long as I'm working for NASA, which is a civilian government agency, I don't enjoy the privileges of my Air Force rank that you've continued to use when addressing me, sir." Frank's voice wasn't hostile, but there was an edge on it. There was something about Ríos he didn't like. For one thing, the Chilean air force officer kept boring in, trying to find holes or chinks in the story of the crew of the *Atlantis*. "That may be difficult to understand, but it's an American way of doing things. We have a definite separation between our civilian and military space programs. That's been our way of doing things since President Eisenhower established the policy of separate space programs back in 1955."

"Then why does your civilian space agency use service pilots?"

"There are lots of civilian shuttle pilots in NASA. But because there aren't enough civilian pilots with enough experience flying very advanced aircraft, Colonel, NASA has to borrow pilots from the Air Force, the Navy, and the Marine Corps. As you undoubtedly know, both Lew Clay and myself happen to be service pilots on detached duty to NASA . . ."

"I beg your pardon, but I am merely carrying out my assignment of investigating the emergency landing of the *Atlantis* on Isla de Pascua," Colonel Rios said without a touch of apology in his voice. "A space shuttle launched into orbit from a military rocket base with military pilots in command . . One can begin to understand the claims of the Soviet Union . . ."

"Colonel!" It was Admiral Montero who admonished his subordinate harshly. "Although it was the claim of the Soviet Union in the United Nations that prompted the president to send this commission to investigate, we are investigating for the President of Chile, *not* for the Soviet Union. We are not here to prove or disprove the Soviet claims. We are here to determine the nature of the situation for the President . . . nothing else."

"Perdóneme, Almirante."

"No importa," Montero muttered, then addressed the crew of the *Atlantis*, "I thank you all very much for your helpful cooperation. We may need to talk with you again later. Now, if you will excuse us, the commission would like to discuss our business in private." He stood up and took Jackie Hart's hand. "One must certainly admire the American space program for more than its high technology." And he kissed her hand.

Joyce and Casey were waiting patiently for them outside the garrison's casern. "Well, gang, how did it go?" Casey wanted to know.

Jackie seemed to be floating on air.

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"Wonderful," she breathed.

Frank looked at her and remarked to Casey, "I'll say one thing for that admiral: he knows how to handle women."

Joyce merely smiled. "Admiral Montero is well known throughout Chile for his way with the ladies," she added.

"Surprisingly, it went very well," Frank went on, "and we were thoroughly questioned without being aware of it."

Lew cocked his head. "You know, you're right. I thought it was just a social occasion because these Latins always like to mix business and pleasure. But, yeah, they did find out a lot about us, didn't they?"

"So? Did we have anything to hide?" Hap shrugged.

Ernesto Obregón emerged from the casern and walked over to them. "They're conducting their discussions in total privacy," he explained. "Not even the governor of Isla de Pascua is to sit in on their discussion."

"How do you think it went, Governor?" Casey wanted to know. "Alice Arnold and Herb Haynes will want to know. In fact, they want to interview the commission . . ."

Obregón shrugged. "It's difficult to tell. They certainly have all the facts. I think there's only one conclusion they can come to because I came to that conclusion myself days ago: There's no military significance to your flight."

"Can I quote you, Governor?" Casey asked quickly.

"No, not as long as my government has an official investigating commission looking into the matter," Obregón told him flatly.

Casey waved his hand. "Okay, I can understand. But, Governor, please don't make an offhand remark like that in front of Alice Arnold . . . or in front of any of the members of the press when they get here. I'll respect a confidence and so will Herb Haynes. But there're lots of American reporters who won't . . ."

"Señor Laskewitz, I'd be very grateful if you'd advise me concerning this when the press plane arrives," Obregón said to him.

"Be happy to, sir. And speaking of the press, our embassy tells me they're getting very restless in Santiago," Casey explained. "It's been five days since the *Atlantis* landed, and only two reporters have been able to get here to cover the story . . . I don't know how much longer I'll be able to keep them happy in Santiago with audio reports from here . . ."

"I thought the matter was up to Richardson," Obregón observed, "and how rapidly that the tent accommodations could be prepared."

"It is, but the media people tell me they'd be willing to sleep in the airplane until the tent city's ready."

Obregón sighed. "Sleeping quarters aren't the total problem, Laskewitz. We can't feed a hundred additional people here, and we don't have the water or sanitation facilities. We're right on the verge of overtaxing this island's facilities already. I'm sorry if I'm going to become the target for the American press, but circumstances force me to restrict the number of people on the island temporarily. Therefore, I have to order the press plane to stay in Santiago until Red Richardson tells me that the

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temporary facilities will handle first the NASA recovery team and secondly the press."

Casey knew when he'd pressed too hard and too far. "Yes, sir. No problem, sir. I'll handle it somehow. It would be a lot of help if you'd let me set up a press conference via satellite with the media people waiting in Santiago. And if we could get the inspection commission to participate, it would help keep those reporters off my back."

"I don't know whether or not they'll talk to the press, Laskewitz."

"At least we can ask them, Governor." Casey knew he was between a rock and a hard place. Both Herb and Alice had filed stories, which had gone into the press pool with loud objections from Alice Arnold. Herb's undeveloped 35-millimeter film that went to Santiago with the Herks yesterday was the only photo coverage that had come from Pascua. Still photos and pool reports had given the reporters and TV crews in Santiago something to file, but they were literally chomping at the bit to get to Pascua and didn't understand why they weren't permitted to do so. It had been only Casey's understanding of the media and its people that had prevented the dam from breaking, but he knew he couldn't hold off the media hordes forever. There were even questions being fired his way via the satellite link with Santiago wondering why Alice Arnold was there along with Herb Haynes, the one who'd been selected by the media as their initial pool man.

"It would also help, sir, if I could give them some sort of schedule so they'd know when they could expect to come," Casey went on. "Right now, they're sitting around the airport or in hotels, not knowing when they'll leave. It doesn't make them any happier. In fact, some of them are beginning to file some rather nasty stories about Chile as well as NASA . . ."

Obregón thought about this for a moment. "Let's talk with Richardson and determine a schedule. Then we can have a radio press conference. If I can convince the commission to participate, it's all to the better. If not, we'll have to do without."

"I think I can cover in the event the commission doesn't want to participate," Casey said thoughtfully. "I'll tell the media people the jury's still out and doesn't want to discuss anything until they've gotten all the information and had the chance to mull it over . . ."

Frank and Joyce decided they'd tag along, but the other three members of the crew said they'd like to try for a swim in the ocean off Hangaroa. Frank caught the vibes from Jackie and Lew that the two had something else in mind, but he didn't say anything.

Red had set up a temporary office in a vacant storeroom in the radio shack at Mataveri. Doctor Esteban and José Hey were both with him, and it was obvious he was having trouble.

"José's doing great with the Pascuans that we've put to work grading the site for the tent city," Red explained, frustration showing in his voice and mannerisms. "But the Chilean contractors who came in with that last flight of Herks don't seem to know what the hell they're doing . . . and I can't explain it to them through Esteban here."

"*¿Qué pasa, Doctor?*" Obregón asked.

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Esteban replied in a stream of rapid Spanish. Obregón nodded and then told Richardson, "Doctor Esteban is not completely familiar with engineering terminology. Perhaps I can help because I understand something about it."

"It's not only my own unfamiliarity with the metric system," Red admitted, "but I can't convince the Chileans that they can't just lay a thin coat of asphalt on the ground for either the turnarounds or the parking ramps . . . not when a C-5 weighs more than three hundred tons. Nobody understands how *big* those mothers are! I know a little pidgin Spanish from growing up in Texas, but not enough to run this show."

"I'll talk to them right away," Obregón promised. "But the main reason we're here is to determine your schedule. When do you plan to have the turnarounds completed and the ramps built so that the C-5's can come?"

"The turnarounds should be completed by the day after tomorrow," Red remarked, "and that'll allow the C-5's to come in . . . but they can't stay long because we won't have any place to park them on the ramps. It'll be a matter of arrive, unload, refuel from the tanker plane, and then take off for Santiago again."

"How about the tent city?" Casey wanted to know.

"Site grading's under way, and if the Pascuans continue to work as well as they are, we'll have most of Ororito City erected by day after tomorrow."

"Can we bring the press plane in then?" Casey asked anxiously.

"If everything continues to run as it is, yes."

"Thanks, Red. That's what I needed to know," Casey told him and turned to Obregón. "It's sixteen hundred hours right now. We can't make the deadlines for the afternoon papers in the States. But if I can schedule that press conference for eighteen hundred hours with both Santiago and New York, it'll make the media people happy because they'll be able to hit the six o'clock TV news."

Obregón nodded. "I'll talk to the commission about it. But you may certainly go ahead, whether they participate or not."

"Will you be available for questions, Governor?"

"Yes, but only on local matters. I'm not in a position to take questions concerning the commission or the Soviet matters."

"Yes, sir, I understand."

Frank went to round up the rest of the crew and surprisingly found the three of them on the abbreviated beach below Hangaroa. In the meantime, Casey went to work in the satellite ground station setting up his press conference. His first step was to contact Roger Service at NASA Headquarters.

"Laskewitz, how long is that Chilean governor going to refuse to let the press plane into Easter Island?" Roger Service snapped from NASA Headquarters. "We're really under the gun here. We've had all sorts of pressure put on us by the networks and wire services. We've even had some calls from the Hill about it."

"It's not totally the decision of the military governor, Roger," Casey told him. "There's simply no way to handle any more people on this island until Red gets the tent city set up."

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"You mean they can't handle eighty media people there?" Roger Service's voice was full of disbelief.

"That's right, Roger. I told you this island's the end of the Earth, and that's no idle metaphor. It can't even handle the seventy-five people of the recovery team, much less another eighty media types. We've got close to thirty people here already . . . and there's no more room. Not enough beds, not enough food, not enough water, and not enough sanitary facilities."

"Is Red dropping the ball, Casey? Look, it's been five days now since the *Atlantis* landed there . . ."

"Roger, there's two thousand miles of water between us and everything else in the world. The logistics of this operation have outstripped anything that was ever considered in the contingency landing plans," Casey persisted, aware that Roger Service had absolutely no concept of what the conditions on Isla de Pascua really were. "When the media gets here in force, they'll see it for themselves. The most important thing we're missing right now is a video camera so we could let the whole world see. As for Red, he's doing a superb job. We'll have the press plane in here day after tomorrow. In the meantime, to keep the animals quiet, we're going to feed an audio news conference out of here via satellite at seventeen hundred hours your time. Since we've got two audio channels available to us through the satellite, it can be an interactive press conference."

"What do you mean?"

Casey sighed. A NASA PAO man should know what that technical term meant. "The media will be able to ask questions. I'll have the crew of the *Atlantis* available along with the military governor. I doubt that we'll get the inspection commission to participate . . ."

"Why? The Soviet claims are damned important, Casey."

"I know that. I think the commission's on our side, and they've certainly seen that the *Atlantis* carries nothing but the Landsat-XIII. But I doubt that we'll be able to get anything out of them until they've considered all the information—which they're doing now—and have made their report to the President of Chile. Look, Roger, this press conference is just for the purpose of taking some of the heat off. You've got about an hour to set it up there in Washington, and I've got to get through to Santiago now to get the troops ready there. I'll be with you here about fifteen minutes before the scheduled start . . . Hang in there."

CHAPTER TWELVE

It was a madhouse when the chartered Pan Am 707 landed at Mataveri two days later.

Casey had tried to work out suitable procedures with Obregón, but the facilities just weren't up to handling eighty media people with all of their recorders, video equipment, and other paraphernalia. Obregón decided to forego visual inspection of baggage and equipment; he didn't have the manpower to do it.

Some of the more vocal media types objected loudly when nobody was permitted to leave the plane until one of Obregón's men had gone through the plane and collected passports. Then, Doctor Esteban went through, looking

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carefully at every yellow International Certificate of Vaccination. Finally, Obregón himself boarded the plane to speak to the media people. He stood at the head of the aisle near the front door and spoke into the microphone of the plane's PA system.

"Welcome to Isla de Pascua. I'm Captain Ernesto Obregón, the military governor. While we're pleased to have you here, I must point out this is a very isolated part of the world and we don't have facilities to handle all of the people required for the recovery of the *Atlantis*. I'm afraid you may find the facilities a bit primitive by your standards, but the tents of Ororito City were the very best that could be provided in the time available.

"There aren't enough trucks or cars on the island to provide you with transportation. I'm sorry, but you'll have to carry your equipment to your quarters, which are about a half-mile away. If you have equipment that's too big or heavy to carry, my men will do their best to help you with the few vehicles we do have.

"I must remind you that you're on Chilean soil and subject to Chilean law. I'm the military governor and the final arbiter and resort. I was educated in the United States, and I understand Americans. I don't intend to be dictatorial, but I will not tolerate gross infractions of our island's rules and regulations. I'll try to be available to you at any reasonable time to answer questions or resolve problems.

"You're free to travel around the island as you wish provided you don't search for artifacts or pick up archaeological specimens without my approval. You may photograph whatever you wish. But please don't get involved with the Pascuans; they've lived here in total isolation for generations, and they don't understand your ways any more than you'll understand theirs. The Pascuans have no concept of personal property, and they'll therefore take anything of yours that captures their fancy. So guard your equipment and personal property carefully. We're not permitting Pascuans to enter the tent city, so your possessions will be safe there . . . from the Pascuans. I presume that you'll protect your valuables from those of you who are living in the tent city . . .

"Casey Laskewitz, the NASA Public Affairs man here, has asked me to tell you that there will be a press conference at the *Atlantis* here on the ramp in two hours. The crew will be present. Thank you. You may now disembark."

Obregón didn't tell them that Casey had helped draft that welcoming speech.

Casey was at the bottom of the loading stairs to welcome each of the media people as they came off . . . and he knew nearly every one of them with the exception of some of the camera crews and technicians. There was remarkably little complaining . . . with a few notable exceptions.

Marty Soloman, the crack science reporter for a major network who'd covered space activities along with general science for years, was a cross that Casey knew he'd have to bear, and he wasn't wrong. The little dark-haired man who seemed so pleasant and knowledgeable on TV was in real life an obnoxious, biased, sensationalistic, and opportunistic little snob. And he was exhibiting

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all of these endearing traits as he got off the plane. Casey could see it coming, and he wondered at that moment what would happen if he ever got Marty together with Alice Arnold. *Like bringing two chunks of U-235 together,* he told himself.

"Casey, what's this crap that I've got to *walk?* Hell, I've got three suitcases of clothes along, to say nothing of all the gear that my crew brought. Don't tell me there aren't any taxis in this godforsaken place?" the little man complained at the top of his voice.

Casey couldn't help it. He laughed loudly at this and was joined by some of Marty's media compatriots who knew him and detested him as well. "Marty, old chap," Casey told him, pointing up to the side of Rano Kao's volcanic cone, "tell me what you see up there."

"Looks like a herd of sheep. What's that got to do with it?"

"The naval garrison's the only outfit with vehicles here, and they don't have many. Those sheep are the only animals on Isla de Pascua. If you want something to carry your gear, go catch a couple of sheep if you can; maybe you can get them to bear your burdens for you . . ."

"Wise guy!"

"Come on, Marty. Rough it with the rest of us," called Hugh Hucksman, one of the anchors on a very popular weekly TV newsmagazine.

"What's the matter, Marty baby? Forget to bring your backpack?" This from Connie Miller, whose slim, petite form belied the fact that she'd roughed it plenty, having covered numerous exploration expeditions, some of them live through satellite remotes, for the award-winning Explorers Club series on NBC.

A week had wrought extensive changes on Isla de Pascua. Ororito City, with enough tents to house and feed a hundred and fifty people, had been erected north of the runway on the slopes of Mount Ororito. Water was still in short supply because the desalinization plant wasn't scheduled to go on line for another day, and the sewage treatment facility was barely in operation. Food would consist of Army canned battle rations until the field kitchens and cooks could be flown in and set up. But there was electricity aplenty from the turbo-generators brought in by the fleet of Herks that now numbered six and that were now making daily round trips to Santiago.

Red had completed the runway turnarounds, and more Chilean crews were working to expand the parking ramps. Most of the difficult and critical early work was nearing completion.

It didn't surprise Casey that some of the creative media people commandeered one of the mess tents and turned it into the Easter Island Press Club, complete with bar stocked from the ample supplies purchased in Santiago and brought along on the press plane.

The press conference in the bright sunlight in front of the *Atlantis* went off well with the usual questions asked and the usual responses given by the crew. It wasn't much different from the initial radio-link news conference the day the *Atlantis* had landed. But as the media was concerned, it *was* different because they were at last on Isla de Pascua, on the spot, able to talk directly to the crew, to Red Richardson, and to Cap-

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tain Obregón. And they were able to transmit their individual video or audio reports back to the States via the satellite ground station. The initial confusion over the sequence of who got to use the station in what order was settled very easily by Casey: the media people drew straws for positions in line.

By now, most of the media crews on Pascua understood why it had taken a whole week before any of them could file stories directly from the island. There were exceptions, but Casey handled them with aplomb.

As the news conference was drawing to a close, two C-5 Galaxy transports appeared in the sky and wheeled around Mataveri, their landing made possible by the fact that the runway turnarounds were now in place. Most of the media people had grown accustomed to the size of the Boeing 747 that was a common sight at JFK and other major international airports. But the C-5 Galaxy looks bigger, flies slower, and was additionally impressive because of the small size of the Mataveri airfield. Even Obregón was visibly impressed as the first Galaxy soared in over Hangaroa to touch its centipede-like landing gear with its 24 main tires on the approach end of Runway One-Zero. The 222-foot wingspan greatly overlapped the 100-foot-wide runway. The four engine pods below the wing weren't over the runway at all, causing their jet blast to kick up huge clouds of sand and dust when the pilot operated the thrust reversers. Colonel Matt Hubbard was pilot-in-command of that first Galaxy and, after he'd parked it on the crowded ramp space of Mataveri, he was able to give the media people a complete rundown of the planned airlift operation. These first two Galaxies contained the rest of Ororito City, food, additional water to subsidize the Pascua supply until the desalinization plant was on line, and several tons of additional cargo. All in all, each Galaxy brought in a hundred tons of cargo and still had fuel left for the return flight to Santiago.

Joy abounded in network headquarters in New York that evening and in wire service bureaus and city rooms around America as well. At last, the media had video direct from the scene. What they didn't know was that the schedule for the recovery operation wouldn't be very exciting or visual to non-technical types until NASA 905 arrived . . . and that was still a problem.

Red discussed it with Joe Marvin in Houston later that evening during the daily progress report conference. "Red, Hank says there's no way they can stretch the range of Nine-Oh-Five by installing additional tanks. With the *Atlantis* on top of her, Nine-Oh-Five is right at maximum gross weight for a Seven-Four-Seven's landing gear. Hank won't risk going over max gross, not off an eighty-eight-hundred-foot runway there."

"Well, tell them to get busy on the mid-air refuelling mod." Red replied testily. "I told them that was the way a week ago."

"Air Force says they looked into it for their Seven-Four-Sevens a couple years ago . . . and the modifications are extensive."

"So? The sooner Hank gets started, the sooner he can get that bird down here."

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"Well, they're working on it, Red. Boeing sent some engineers to Dryden, and Lockheed sent over the team they'd used to install the in-flight refuelling system in the C-141B's, and the Air Force has some of their refuelling experts over from Edwards next door. It'll be a jury-rig, but they'll figure out something that'll work."

"You know, Joe, it just occurred to me: How the hell did they expect to airlift an Orbiter back from Okinawa or Spain with a range of only nineteen hundred nautical miles max? Why didn't somebody think about this before?"

"Because," Joe Marvin said quietly, "this whole program was planned and scheduled on a no-fail basis right from the day the contract was signed in 1972. Nobody could afford to put much thought into what would happen if it failed . . . and the people who made those early decisions are long gone into retirement . . ."

"Leaving us to hang in their stead if we don't pull off a miracle."

"You said it. I didn't."

It didn't make Red Richardson feel better.

Alice Arnold was also in a blue funk. For a whole week she'd had to divvy up the *Atlantis* story with only Herb Haynes, and he was a pussy cat to handle as far as she was concerned. She was angry at NASA because it'd taken so long to set up the satellite ground station. She'd had only four days of exclusive story coverage before the media horde moved in on her. Now, she was back in the competitive rat race. Her only compensation was that she managed to hang onto her room with Jackie and Joyce at the Hangaroa Hotel and didn't have to move into Ororito City to share a tent with other female media types.

She couldn't face the idea of going up to the newly established Press Club at Ororito City. Instead, she walked into the small bar located in one corner of the dining room at the Hotel Hangaroa . . . and found Joyce, Frank, and Hap Hazard there.

"May I join you?" she asked.

Frank started to say something, but Hap put in, "Sure, why not?"

"Thanks. The new Press Club's a little bit far for me to walk tonight."

"I wondered why you were here instead of up with your media friends," Frank said.

"They don't know about this yet, so it's still a place where I can come for some peace and quiet," Alice admitted. "Look, with the prices being what they are here, let me buy. I'm on expense account, not per diem like all of you . . ."

"Well, that's mighty friendly of you, Alice," Hap bubbled.

"You look like you've just lost your last friend," Frank observed after José Hey—who was bartender as well as hotel manager—served another round.

"You're a very perceptive man," Alice told him.

"Well, I can understand, too," Joyce put in for the first time since Alice had joined them. "You no longer have a semi-exclusive story here."

"Oh, that doesn't bother me," Alice lied. "I've had almost a week to get to know everybody on a personal basis . . . and that gives me a leg up on the ones who arrived today. For example, I can go directly to

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Obregón . . . or to you, Frank. The sort of stories I file out of here from now on will be personal interest stuff.''

''What makes you think we're personally interesting?'' Frank wanted to know. ''I'm just an old fighter jock . . .''

''Aw, don't belittle yourself, Frank,'' Hap objected. ''Don't you know that Headquarters wants us to put on the Big Astronaut Act, just like in the old days with the Apollo Project when astronauts were all supermen instead of like we really are: ordinary, everyday, plain-vanilla truck drivers with no real hope that we'll ever get the chance to go further than delivering space science stuff to low-Earth orbit . . . when we could be building space factories and power satellites and space colonies.'' Hap was getting full of Johnny Walker Red Label.

''Speak for yourself, Hap,'' Frank said. ''Better yet, go hit the sack. Looks like you've had a long, hard day.''

''Yeah, answering the same old questions from the Chilean inspection commission,'' Hap went on complaining. ''They've been here three days now. When the hell are they going to decide we're telling the truth about our mission and payload?''

''Probably when they get good and ready,'' Joyce put in. ''Look, Hap, they know you're not lying about the payload, and they know the Soviets have thrown out a red herring here for political purposes. Their main concern is how to word their report so it keeps the Russian Bear off their necks. Nobody these days is sure and certain the United States will come to their rescue, not since Viet Nam, Cambodia, Angola, Iran, Afghanistan . . . The list keeps getting longer all the time. The commission knows they've got a real hot issue here, and they're worried about exactly how to handle it. I've talked to them about it.''

''How'd you manage that?'' Alice wanted to know. ''They've been completely secretive, hiding out in Obregón's casern.''

''Oh, I've known Colonel Ríos and Professor Pérez for a long time,'' Joyce advised her.

''Yeah, I forgot you grew up in this dirty, primitive, backwater part of the world,'' Alice remarked.

Joyce bristled. ''You're making the same mistake that most Americans do. That's what gets our country into trouble. The Chileans have their own history, their own country, their own traditions . . . and they're proud of them. If I were one, I'd probably resent Americans like you with that attitude. As it is, that's what causes the Department of State a lot of problems dealing with the rest of the world.''

''Look, dear, that's what us taxpayers are paying you to do,'' Alice fired back. ''I've got friends in the Executive Office Building, and I know damned good and well that our foreign policy would be a hell of a lot better off if you people in Old Foggy Bottom weren't so damned wishy-washy and showed a little backbone occasionally.''

Joyce pushed back from the bar and stood up. ''Excuse me, please,'' she said and walked out of the room, leaving the three of them staring.

''Got her!'' Alice chortled and upended her glass.

Hap didn't say anything. He was more than slightly embarrassed over the

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encounter between the two women.

Frank looked at his drink and quietly asked, "Why did you do that, Alice? She's right, you know. Some day, you're going to find yourself in deep trouble."

"Not with that good old press card in my wallet!"

"Sure."

Hap pushed back from the bar, leaving most of his drink untouched. "Excuse me, I'm still kind of bushed from my bout with that Pascuan sani-flush I got hold of. Think I'll turn in." He walked slowly out.

"Hey, José Hey!" Alice called. "Set 'em up again, man!" Then she turned to Frank. "Well, at last I've got you alone."

Frank turned to look at her. "Oh? Well, now that you've got me, what are you going to do with me? Eat me?"

"I might. I've never eaten a space shuttle command pilot before. You might taste pretty good. Different, anyway."

Frank sighed. "If you'd been around about fifteen years ago when I was a hot young captain eager to get his hands on fast airplanes and fast women, we might have found out, Alice. But them days are gone forever, as the old saying goes."

"The old saying may be wrong, you know."

"I don't think this is the time or the place to find out whether it is or not."

"Okay," Alice persisted, "let's check out another old adage that says all bets are off when a pilot's more than fifty miles from home. Christ, Frank, you're half a world away from Seabrook, Texas!"

"No, I'm not. Physically in terms of miles, maybe, but not inside where it counts for me. Thanks for the drink, Alice. Maybe the Easter Island Press Club won't seem too far away now." He got up and started to walk away.

"God damn you!"

He turned. "Quite possibly. You know, Alice, you've changed my mind about a lot of things. For example, I once thought that Jackie was a tough bitch. Good night."

But Frank didn't go upstairs to the room he shared with Casey and Red. Not just yet. He wandered out into Hangaroa and began walking slowly northward to where he could see the seven huge *moai* standing on the *ahu* in the moonlight, gazing forever westward toward the sea.

He was more than a little upset over the brash encounter with Alice Arnold. In his time, he'd met many brash and pushy women on the make for hot jet jocks. And, in his time before marrying Ellie, he'd played the role of the hot jet jock. It had been 12 years now, and in spite of the behavior of his fellow pilots, Frank had tried to play fair with Ellie not out of religious conviction but for one simple reason: he loved her and couldn't even imagine going to bed with another woman. He'd grown expert at handling the young groupies, and some of the older ones, as well. Once there was the general's wife who . . . that'd been one of the unusual ones.

Every time he walked away from an affair, he felt badly. He didn't know why.

And he ended up walking—across the Mohave Desert, along the beach at Cocoa or Elgin, through the hills above

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Vandenberg, or just along the flight line of whatever Air Force base he was at. Now he walked slowly along the dirt road northward out of Hangaroa on Rapa Nui.

He was walking faster than usual with his mind preoccupied with the anger of the encounter with Alice. His anger at himself or his anger at Alice: he couldn't separate them in his mind. It was something like the time that woman M.D. who'd become a payload specialist had outright propositioned him late one night in his office in Houston. He'd almost walked all the way home to Seabrook before he came to himself again.

This time on Rapa Nui in the moonlight, he almost walked right over somebody else going in the same direction at a slower pace.

"Oops! Sorry. Uh . . Joyce! What the hell are you doing out here at this time of night?" he asked as he helped her to her feet after practically running over her.

"Wow, you're sure heading somewhere at full bore, Frank," she replied, dusting off her slacks. "I was going to ask you the same question."

"I asked you first," he reminded her.

"Let's keep walking. I might tell you," she remarked, resuming her leisurely amble along the dirt track toward the seven *moai*.

They walked in silence for several minutes until the seven huge stone statues loomed tall above them. Frank finally asked, "Well?"

Joyce sighed. "I can't afford to lose my temper or argue in public. My training's been too strict for that . . ." she started to explain.

"I didn't think the State Department conducted such training."

"They don't. My father pounded it into me. According to him, it's better to step out of an argument, whether you think you can win or not. If you lose, you've irreparably damaged whatever cause you've championed; if you win, you never stand a chance of really making a friend or a convert of your opponent. So I just had to stroll out here and cool off after the incident in the bar . . ."

Frank chuckled. "Hap was the smart one."

"What do you mean?"

"He excused himself and left right after you did. He avoided both an argument and being left alone with Alice Arnold."

Joyce looked up at him. "So you were left alone with her, huh?"

Frank nodded.

"And?"

"I don't like pushy bitches."

"You seem to get along fine with Jackie."

"Compare the two," Frank suggested, and went on to explain, "Jackie's a pussy cat in comparison. Jackie just wants to fly the hottest and newest stuff available. She doesn't want to compete with men, but she must, to do what she wants to. Jackie seems pushy and bitchy at times because she's chosen a field that's been almost totally dominated by men . . . with the exception of some few rather outstanding women from time to time."

"Is Jackie good?"

"Jackie's an outstanding pilot and mission specialist. She'll be one of the first women shuttle pilots, if not *the* first."

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Joyce nodded. "I see. I guess I haven't known Jackie long enough. On the other hand, Alice . . . Well, I don't guess we have to analyze Alice, do we?"

"Nope."

"So why did you walk away from her?" Joyce wanted to know. "I thought you pilots were game to try anything, especially away from home."

"That's the image all right. But it's also a generalization."

"You love her very much, don't you?"

"My wife? Yes, I do, Joyce."

They'd reached the site of the seven statues now and walked quietly around the level stone *ahu* altar platform until they could look up at them in the moonlight. "Think of all they've seen," Joyce remarked.

"Open canoes, sailing ships, steamships, airplanes, jet planes, and now space ships," Frank mused.

"Gods, great chiefs, sea captains, slavers, explorers, conquerors, warriors . . . and astronauts," she added, "not to mention the women who were usually with them."

"Or waiting at home."

"Where's 'home,' Frank?"

"Seabrook, Texas."

"No, Frank, that's where you're living right now. That's where you get your mail. Where's *home?* Where do you *live?*"

Frank thought about what she'd said, then replied, "I'm not sure. Maybe I live 'out there' somewhere. Maybe somewhere in space is my ultimate home. God knows I've spent most of my life trying to get there. Maybe I'm trying to go home again." He stopped, then asked, "Where do you live, Joyce? Maybe that'll give me a clue."

She spread her hands to indicate their surroundings, "Right here, right now. My past is a memory. My future hasn't become a memory yet. And don't ask me where that future is; I don't really know. Maybe I'm trying to go home again, too. But you're fortunate; you think you know where 'home' is. Maybe it's out there in space; maybe it's truly in Seabrook, Texas after all. Maybe home is where the heart is, where love is, wherever love exists."

"You're different," Frank told her.

"Of course. So are you."

"And you've loved many people, haven't you? I can tell."

"Certainly. The more I've loved, the more I'm capable of loving. I'm very close to my family; I love them very much," Joyce admitted candidly. Then, almost as an afterthought in case Frank might not fully understand, she went on, "You see, I don't have that unfortunate American belief that love's so special that it has to be rationed to only a few people exclusively in a person's life. In South America, they know differently; their heritage is Hispanic and Arabic, not puritan and Teutonic. And I grew up in South America where I've known and loved many people, too."

"Casey told me."

"Casey told you what?"

"That you knew practically everybody from the prime minister's secretary to two of the members of the inspection commission."

She nodded. "But not everybody."

"You're not married, Joyce?" It was a rhetorical question.

"No. Getting a Chem-E degree at

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MIT didn't leave much time for a roaring social life, even with a skewed male-female ratio in the student body."

"Joyce, you're going to make some lucky man very happy someday."

"How do you know I haven't already . . . and several, at that?"

"I don't know. Have you? And how many?"

"None of your business! That's my little secret. It will make me seem mysterious and somehow more secretly desirable." She was kidding him, and he knew it.

"I'm flattered," he retorted. "Whatever made you think something would make you more mysterious and secretly desirable to me, a happily married space shuttle command pilot only thousands of miles from home and for all intents and purposes completely alone on a South Sea island with you? Aren't you taking a big risk?"

"No. I know you. I think I've known you all my life. Because I know exactly what you're thinking. I know the conflict going on behind those eyes. I know you still ration love because you're an American right down to your NASA nomex flight coveralls."

"Are you so sure you know what's under these NASA-issue nomex flight coveralls, Joyce?"

"Pretty sure."

"I'd like the chance to prove you're wrong."

"You just have. You are one of my loved ones. *Usted es muy hermoso. ¡Venga acá!*"

It was a totally new experience for Frank King, the seasoned fighter jock, test pilot, and shuttle astronaut.

For the first time, he felt totally enfolded and cherished. Far beyond the joyful physical sharing of each other, Joyce made him a complete part of a union that far transcended basic sexual activities and both drew from him and gave him a deeply emotional and almost psychic force of great power that allowed him to continue far beyond his former limits of time and available energy. Willing, enfolding, embracing, responsive, and sharing, they created between them a rhapsody that he hadn't known before. But she had, for she knew exactly how to go beyond the mundane physical actions and convert sheer magic fantasy into a creative new reality for this man she'd wanted to touch and metamorphize from the first time she'd seen him. It was mutual and reciprocal on his part but far from the experiences that had been rushed, harsh, sweet, or merely physical.

Frank felt very strange as they watched the sun come up on the seven *moai*. He felt absolutely no guilt and no remorse. For the first time in many long years, he'd shared something totally and deeply. There was an equally strange glow about the *ahu* and the seven *moai* in the early sunlight, an aura that he felt couldn't totally be the result of the sunrise light.

And a new idea flickered through his mind and was gone:

Even if he went to the end of the solar system, there was something special about this magic place that would always be one of the many places he'd call home from now on.

He didn't know why. He didn't ask why. Perhaps this was a magic place. Maybe the Pascuans knew, or maybe the *moai* could answer his question if

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they could speak. It didn't matter. It was a joyous memory, and he'd leave it at that. But he was somehow different now as he came back to his reality again.

But there was still a tiny, nagging worry in the recesses of his mind.

Both Casey and Red were logging heavy sack time as he quietly let himself into the room. Ten to one, he thought, Casey had helped inaugurate the Easter Island Press Club last night. And Red had probably been with him. It must have been a wild and raucous party. But up at the seven *moai* only four miles away, Frank had gotten the impression there was nobody but the two of them within thousands of miles.

He gave a quiet snort as he shaved. Was there something unknown, special, or magic about Rapa Nui after all? Why had ancient people chosen it as the site for huge statues laboriously hand-carved from volcanic rock? Why, after many archaeological expeditions, did Rapa Nui still have an aura of mystery about it? And why did it just happen to be there, right under the orbital ascent path of the *Atlantis*, with a runway just conveniently long enough to accommodate it? Why had Space Shuttle Orbiter OV-104, strangely named the *Atlantis*, malfunctioned so that it was possible to land it *only* on Rapa Nui?

Frank had never been a superstitious man, in contrast to some of his fighter jock buddies over the years. He'd just done his job by extending his sensory impressions into whatever hot machine he was operating at the time. But he found himself thinking about these things for the first time this morning.

He went down to breakfast without his two roommates, who were still giving a respectable impression of a sawmill in full operation. He was shortly joined by Jackie, Lew, Hap, and Herb Haynes. There was nothing but small talk until Captain Ernesto Obregón walked in, saw them, and came straight over to where they were eating in the sunlight.

"*Buenos días, mon capitaine,*" Frank greeted him.

"You're mixing your languages," Obregón pointed out. "You'd best stick to one you know a little bit about and talk English. Where're Red Richardson and Casey Laskewitz?"

"Still sleeping off the inaugural ball of the Easter Island Press Club," Frank told him.

"Yes, it was a good party. Casey Laskewitz got me acquainted with a lot of the American press," Obregón replied without batting an eye. "I need to know when the next plane's scheduled to leave for Santiago."

"Did you check with Colonel Matt Hubbard?" Lew wanted to know. "He's command pilot of the lead C-5 Galaxy, and he's handling flight operations."

"Where is he?"

"Probably sleeping in his plane. That bird's a flying hotel," Frank pointed out.

Obregón nodded. "I'll check with him. But I still need to get Casey Laskewitz out of bed. Admiral Montero told me he wants to announce the commission's preliminary report after he talks to Santiago via satellite this morning, and he's agreed to a press conference after he's done so."

Frank got up. "I'll get him, Ernesto. When does the Admiral want to make

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the announcement?"

"Before noon, and he wants to be on the next flight back."

Admiral Eduardo Miguel Montero chose to conduct his preliminary announcement and press conference on the ramp at Mataveri in the open forward cargo door of a C-5 Galaxy with the cargo hold floor as a stage. The cream of the world's press managed to stagger out of their cots in Ororito City, get their act together, and be on hand on the ramp, cameras, recorders, and notebooks ready. He was joined by the other two members of the commission, and he invited Obregón and the four *Atlantis* crew members to join him. Montero was not totally unaware of the need for theatrics in making his announcement. And he did so in English.

The direct TV satellite link permitted anxious people in Washington, Houston, and New York to watch . . . as well as others in Moskva and elsewhere who were perhaps not quite so tense.

"Ladies and gentlemen," Montero began, "the President of the Republic of Chile has created this special investigating commission to look into the details of the emergency landing of the United States Space Shuttle *Atlantis* on Isla de Pascua, which is Chilean soil. The commission has consisted of myself as chairman, Colonel Amaldo Carlos Ríos of the Fuerza Aerea Chile or the Chilean air force, and Professor José Ricardo Pérez, the president of the Sociedad Interplanetaria Chilena, the Chilean representative to the International Astronautical Federation.

"We have inspected and confirmed the validity of the necessary international documents relating to the *Atlantis*, her crew, and her cargo. We have personally inspected the interior of the *Atlantis* and directly viewed the cargo. We have questioned the members of the crew. We have discussed privately within the commission all information that has been willingly made available to us, all that we have been able to obtain ourselves, and all that could reasonably be expected to be investigated by a commission such as this.

"On the basis of this timely inspection conducted on Isla de Pascua itself, it is the conclusion of this special investigation commission that the *Atlantis* was launched from a military launch site, Vandenberg Air Force Base, California, a site used for both military *and* civilian space launches by the United States of America. Further, the commission finds that the purpose of the flight of the *Atlantis* was to place in a polar orbit a civilian satellite known as Landsat-XIII whose mission would have been to monitor non-military Earth activities such as sea conditions, pollution, and so forth. The *Atlantis* was manned by a civilian crew of four qualified NASA astronauts. The *Atlantis* suffered an emergency of unknown cause that prevented it from completing its flight into orbit and required that an emergency landing be made on Isla de Pascua which was the only landing site available to its pilot.

"There was no military activity connected with the flight or emergency landing of the *Atlantis*. And as a representative of the government of the Republic of Chile, I pledge the full efforts and support of the government of Chile in permitting the United States to recover the *Atlantis* from Isla de Pascua

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and return it to the United States.

"Colonel Ríos and I will return today to Santiago to make our full report to the President of Chile. Professor Pérez has elected to remain on Isla de Pascua as an observer to provide incontrovertible witness to the continued non-military nature of this flight, landing, and rescue operation.

"We will accept questions from the press for fifteen minutes. Then we must return in this Galaxy transport to Santiago so that I may make our report to our President this evening."

There were fifteen minutes of questions from the gathered press, most of the questions having answers that were contained in the Admiral's statement itself. Finally, there was a general handshaking all around. The Admiral and the Colonel clambered up the ladder to the forward flight deck. The crew of the *Atlantis* and Captain Obregón descended to the ramp. The huge nose door swung down to seal the front of the cavernous cargo hold. The ramp was cleared before the engines started.

Colonel Matt Hubbard stepped to Frank's side as the Galaxy taxied out to the runway. "Glad to get it out of here," he remarked.

"I thought you were command pilot for Number One Galaxy," Frank said.

"I was, but I've got to lay in here where the action and the problems are. This airlift requires some complex scheduling," Hubbard explained. "I've got two more C-5's due here at thirteen hundred local. We don't have ramp room for more than two at once until Richardson and those Chilean crews get the ramps expanded, and I'm having one hell of a time scheduling the Herks in between the Galaxies."

"Want some help?" Frank volunteered. "The four of us know something about flight scheduling, and we're about as useful as tits on a boxcar around here for awhile. If we don't do something, Red will probably send us back to Houston to get us out from under foot."

"Hell, yes, I need your help," Hubbard replied.

The C-5 turned at the end of the runway, piled up a huge cloud of dust and sand as its engines came up to speed, then began to move slowly along the ground. Running light with no cargo and only fuel aboard, it lifted off after using only half the runway, leaving behind two plumes of dust where its engines had overlapped the sides of the asphalt. Its 28 wheels retracted into the belly, and it began a long, slow climbing left turn to the east.

Frank watched it go. "Fascinating."

"What is?" Matt Hubbard asked.

"That something that big can fly. I'm strictly an old fighter jock, you know."

"I gotta laugh at that statement coming from a space shuttle command pilot," Hubbard told him.

The C-5 was rapidly disappearing to the southeast in a climb. Frank continued to watch it.

He wasn't sure later exactly what happened.

Did the wing come off first?

Or did the explosion happen first?

The C-5 Galaxy carrying two members of the Chilean commission, one of whom was the Admiral of the Armada de Chile, ceased to exist and became an expanding yellow ball of fire speckled with disintegrating pieces. ■

END OF PART III

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THE ALTERNATE VIEW

G. HARRY STINE

COMMUNICATION BARRIER

I've been writing half of "The Alternate View" since its inception in the May 1979 issue. I've learned as much from it as I hope the readers have.

But what I've learned disturbs me greatly.

I've known for a long time that there's a communications barrier between people because of language. There's even a communications barrier between those who have the same "milk" language: the means of verbal communication that they were taught by their parents. This affects a person's thought processes because throughout one's life one thinks according to the structure, logic, and basic semantics of one's native language.

And why not? When you stop to consider it, your thoughts are always in words, aren't they?

Thus, one's "universe view" is *always* determined by one's native language. And this structuring of the world and of one's philosophy differs from language to language, as anyone who's tried to learn another language will readily agree. French is different from German is different from Swedish is different from Spanish is different from Slavic . . . and all of these languages are fortunate in having the same basic Indo-European roots. The thinking structure and logic of Oriental languages are quite different and almost alien to one whose native tongue is an Indo-European language.

I fully expected to have some problems communicating with a reader whose native language is anything but North American English (which is different in subtle ways from British English or Australian English). But I didn't expect to have communication problems with those whose native language *is* North American English.

One expects some communication problems with the spoken word in other than face-to-face encounters because facial expressions and body language convey as much, if not more, information than the spoken language itself. But one does not expect severe communication problems with the written word because, even though intonation and inflection are missing, the written word can be re-read and its precise use in context can be studied again and again if meaning doesn't come through on the first reading.

Both Jerry Pournelle and I are professional writers and we attempt to be as precise as possible in our use of words and phrases. We both know how to write a semantically-loaded sentence, paragraph, or article. Therefore, we don't use words and phrases without careful consideration.

I wish some readers were as careful

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when they read what we've written with such care.

Almost everyone sits down to read something with a full and complete set of preconceived notions, most of which are completely false-to-fact because of education. This is not helped by the imprecise and non-logical nature of the English language. But I don't blame the language.

In common with Jerry, I've received some outrageous letters and other communications as a result of "The Alternate View" and other articles and stories. We expect the "nut letters" and know what to do with them.

But it bothers me when I get a nicely-typed letter on good letterhead from a reader who's obviously a well-educated professional, managerial, artistic, or technical person who's fallen prey to one or both of two common maladies among North Americans today: (a) laziness, and/or (b) reading into what we write only what *they* want to believe.

Laziness has no excuse. I refer to the letters that request either more information or copies of my references. "My library hasn't got it!" is the most common excuse. Well, the library *can get it*. Or the reader can go to a book store and ask to see a copy of the latest volume of "Books In Print." If it isn't in print, it can usually be found through a used-book service, and there are many of those. Information can be obtained about anything written by anybody on any subject you can possibly think of. Even if you're out in the boonies of East Chitlin Switch, Montana, you can still obtain books by mail-order.

. . . But not if you're lazy and think you can con the author out of copies of his references. (In the first place, you can't because he wrote that piece six months ago and has eliminated the data from the piles of paper in his study so that he can have access to information about something he's writing about *now*. Or the references may amount to a quarter of a century of working in or thinking about a particular field or subject.)

However, reading into an article, column, or piece only what the individual reader *wants* to read or to believe in is a problem that I don't know how to solve . . . and I doubt if anybody else does either because it's a common malady among authors and editors. Perhaps it has its roots in our educational system; we're really not taught to read carefully.

But perhaps the roots are down on the level where the child in each of us wants the universe to behave the way we *want* it to. As a result, people shun the hard data of scientific evidence, accept wishful thinking as fact, rely on blind faith, and conscientiously shut out of their minds *any* data that disagrees with these preconceived notions and threatens to destroy the carefully constructed universe-view invented to make an apparently capricious world an orderly one.

Scientific and technical people are not immune, either. Based on a few things they know to be demonstrable, some have built an incredible edifice of theory and belief based on an incomplete foundation. They're immune to argument because they *know* what the universe is about.

Almost as interesting are the letters with a sexual connotation or bias.

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Nearly every author's been propositioned by mail and there are some who make a hobby of accepting. Most of the letters of this sort I've received made fascinating reading for a psychiatrist friend who has his feet solidly on the ground and is a *very* sane person. Today's generation apparently looks for kicks in sexual aberrations they attribute to authors or their characters. I pity these people because our culture's made sex so acceptable it's passé.

We are a bi-sexual mammalian species. That means there are two sexes. To expand Robert A. Heinlein's definition, love is that condition where the happiness of another being is essential to your own happiness. There can be love without sex just as there can be sex without love. But some readers have a hang-up there.

Contrary to reality, everybody believes one has a right to one's own opinion. They don't, but that's a future column subject.

This is the only way I can understand or explain some of the letters and other forms of reader reaction engendered by these columns over the past year.

Mind you, I'm absolutely certain that each corresponding reader felt entirely justified and extremely rational. Robert A. Heinlein stated, "Man is not a rational animal; he is a rationalizing animal!"

These "Alternative View" columns have been about science and technology as seen from the separate viewpoints of Jerry and me. We haven't argued the hard data, but often the interpretation, consequences or priorities of the data. Jerry and I disagree on very little, but we're quite vocal on the minor points where we *do* disagree. That makes this column fun to write!

Let's get something straight between us. It's my job to present an alternate view to that of Jerry *or* to some commonly-held belief or shibboleth. Sometimes I don't believe the stand I take, but I present the viewpoint for the purpose of making the reader do something that some people absolutely detest: *think*. Don't automatically assume my personal philosophy is always reflected in these columns. And I'm not trying to sell any gadget, theory, hypothesis, or philosophy that I may from time to time present herein. If I wanted to sell hardware, I wouldn't do it here. I'm *not* interested in whether or not your idea for a new invention works, but I *am* interested if you have solid data, have a repeatable experiment, and in the face of that data you're being ignored when you shouldn't be. I'm no longer a hardware type although I've put in my apprenticeship dealing with hardware and I'm still interested in it.

Lastly, if you write me, don't *demand* an answer. You won't get it. You stand a better chance of getting a reply if you send a stamped self-addressed envelope.

And *read* what both Jerry and I write before you sit down to write, and then *read* what you've written before you mail it off to us!

Otherwise, you're adding to a communication barrier that's already inherent in human languages and especially in ours.

Although I haven't checked the subject matter of this column with Jerry, I believe he'd agree with me. If he doesn't, it'll be interesting! ■

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THE REFERENCE LIBRARY

By Tom Easton

The High Tower, John Tomerlin, Bantam, $2.25, 224 pp.
Homeworld, Harry Harrison, Bantam, $1.95, 208 pp.
The Paradise Plot, Ed Naha, Bantam, $2.25, 352 pp.
Serpent's Reach, C. J. Cherryh, DAW, $2.25, 287 pp.
Star God, Allen L. Wold, St. Martin's, $9.95, 191 pp.
Wizard, John Varley, Berkley/Putnam, $12.95, 355 pp.
Universe 10, Terry Carr, ed., Doubleday, $8.95, 182 pp.
What If? Vol. 1, Richard A. Lupoff, ed., Pocket Books, $2.50, 225 pp.
The Space Enterprise, G. Harry Stine, Ace, $6.95, 226 pp.
Teaching Science Fiction: Education for Tomorrow, Jack Williamson, ed., Owlswick Press, $15.00, 261 pp.

I've taken my stabs at defining science fiction. I haven't had any great success at coming up with a statement that would include everything SF writers and readers agree must be covered or exclude everything we agree must be left out, but then neither has anyone else. The question is one that might best be left alone, like a sore tooth. However, also like a sore tooth, it demands attention. It demands attention especially when we are faced with those odd books, neither fish, fowl, nor SF, that defy categorization.

I have one such before me now. Bantam sent me galleys of John Tomerlin's **The High Tower**. Now, Bantam knows I'm a SF reviewer, so they must be peddling the book as SF. Right? Right. And true, the tale takes place in a vague future. But there are no rockets, time machines, aliens, or other hallmark paraphernalia of SF. In fact, about the only thing in the novel's world that is not of the here-and-now is the social structure it inhabits.

The story centers around one Paul Oliver, who with his family is transferred to a newly built branch of his company, a giant among manufacturers. The new branch is a thorough company town, with dwellings—the Tower of the title holds apartments graded with height to match corporate status

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—schools, stores, restaurants, theaters, parks, offices, factories, and all the rest. It is isolated, hard to reach from outside, and it is run in as thoroughly paternalistic a style as was ever imagined.

Paul Oliver is in Management. He has an apartment on a comfortably high level of the Tower. He has a satisfying job within the company. His future seems assured. But he begins to find signs that the company seems to want to control its employees' lives in intimate detail—even to the clothes they wear and the people they sleep with. He encounters demands that he compromise his personal and professional principles in return for advancement. When he resists, he finds himself shifted into a nothing job and his family bumped downstairs into more slum-like apartments. When he decides to leave, he finds he cannot even mail a job application out of town. He is trapped, body, soul, and family. When he and others try to break out, they destroy the com-

What is the story all about? The company's head, Boris Wickersham, tells us in a soliloquy delivered as he watches his lifework fall apart: "Power was all he loved, or ever had loved—the one passion that time could not diminish, the only consummation that never failed. To command others was the unique victory in a game where fame, position, and wealth were mere counters; tokens for the real thing. He'd worked and schemed; made fortunes and given them away; raised men to peaks of glory and dashed others to undeserved oblivion—for power. Without it, his life was meaningless, a mockery. Most ironic of all was that the very extent of the power he'd wielded rendered him helpless now. By gathering every rein of control to himself, taking every burden of decision, reserving every option, he'd reached the point where his own helplessness paralyzed his organization as well. With communications gone, there was nothing he or anyone else could do to avert disaster." In fact, he was limited to dying while squashing the palace revolution that paralleled the proletarian uprising.

The power trip—it's a potent theme, and one often explored in fiction. It is well explored here. *The High Tower* is a powerful story, told in a way that may make you rage and cry by turns. But is it science fiction? If it is, it is so only on the surface. Go any deeper than that, and you have an allegory, a mainstream device hoarier by far than Swift's Laputa or Orwell's *Animal Farm*.

Is it worth reading? I think so. It has a richness of event and idea and implication that could let me go on for this whole column without exhausting it (though I might run the risk of making myself look silly; reviewing is both easier and safer than analytical criticism). And like any decent fiction, it casts a certain light on the status quo. It warns against paternalistic trends in government and industry, against the cradle-to-grave welfare state and its dehumanizing effects, against the refusal of risk and responsibility and honor. It cries out in anguish and eloquence far beyond the voice of most SF. And it is a voice alone in the wilderness, for it will make no difference whatsoever, no, not though it were twice or thrice as eloquent.

Another Bantam—Harry Harrison is bringing out another trilogy, one with a theme a mite less elemental than that of the Deathworld books. (Remember how good they were? They make you expect wonders of the man, don't they?) This one begins with **Homeworld**, at home, on an Earth that has weathered a crisis of resource exhaustion thanks to solar power satellites, fusion power,

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and a program of ruthless depopulation. It is ruled by a technocratic elite and peopled by plebes little better off than slaves. The world government's security arm uses computers and total bugging to keep tabs on anyone they wish, to keep the elite secure in a power they seized in the crisis. It's the power trip again, of course, but Harrison's vision seems somewhat more optimistic. His hero, engineer Jan Kulozik, has his eyes opened to the truth of his world by an Israeli subversive, Sara, who shows him the exploitation around him, the rewriting of history—Israel, the books say, no longer exists; democracy ended in Athens, etc.—the control even of Jan's own elite, even of Jan himself. He is introduced to the concept of freedom, and he joins the underground. But Security is potent, the underground is exposed, and Jan is sent into exile by his own brother-in-law. I expose this much of the end because it sets up the sequel; because we know there is a sequel, we know the despair of the end is at least partly false. *Homeworld* will be followed by *Wheelworld*, and then by *Starworld*. In the end, we feel sure, Jan will conquer the forces of control and restore freedom to his culture.

However, Harrison has not lavished on *Homeworld* the same inventiveness and wit he gave to the Deathworld books. He still has his moments, as when Jan switches pens with his brother-in-law to hoist Security by its own bug, but by and large, if you expect another Deathworld you will be disappointed. Don't let that keep you away, though. *Homeworld* is more than readable in its own right, and I expect to be able to say the same of its sequels.

Still another Bantam, this one a L*E*M*O*N. Ed Naha's **The Paradise Plot** may be interesting enough as a SF mystery—Island One, an O'Neill habitat, is plagued by a murderer whose motive seems to be to avenge the "children of light," thirteen savants whose plight has been hushed up by the colony's powers-that-be for fear of being closed down. They were mind-blown and made telepathic by the mystic powers of cosmic radiation. The same accident that exposed the savants also exposed a number of kinds of plant seeds, resulting in instant mutations and weird "hybrids." As the mystery falls under the scrutiny of a jaded investigative reporter, on the colony to report the visit of a government commission there to evaluate its value for the future, our scribbler—I hesitate to call him a writer—parades before us a long string of stereotyped tough cops, cynical pols, and an engineer who made his rep by paving the Everglades (as part of the U.S.'s "expand and multiply" program, a bit of business that totally ignores the demographic transition now occurring around the globe). Though the reporter consistently fails to ask the right questions, he does eventually uncover the truth. Along the way, we are assailed with the long-debunked claim that space can be a sink for excess population and with such screwy examples of authorial physics as the idea that since an O'Neill cylinder has strips of land alternating with strips of "sky" around its circumference, the "sky" strips must enjoy some immunity to centrifugal force—g forces are zero there.

I can accept Naha's stereotypes and extravagances, either as tongue-in-cheek satire or because the meatheads that constitute the bulk of the reading public (Sturgeon's Law, don't you know?) won't know the difference. But the science! Naha understands nothing about radiation, biology, gravity, or the space

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environment. And it's no excuse that he's not a scientist (I hope he's not!), not when so much SF has handled the materials well enough for him to have learned painlessly.

Furthermore . . . Ah, the hell with it. If you're a meathead, take the book, welcome to it, and best wishes. If you're not, steer clear, my friend, steer clear!

For interesting aliens, try C. J. Cherryh's **Serpent's Reach**. In it, she has created what may be the first sympathetic hive mind in SF. The Reach is populated by humans and the Hives. Centuries ago, the first humans got themselves accepted by the Hives by pretending to be a Hive of their own. They then increased their numbers with the aid of frozen ova. Given immortality by the real Hives, they became the Kontrin. The lab-born, programmed to a Puritan-Ethic subservience, became the Betas and created the cloned azi. Interestingly, the Betas' programs seem to have bred true, a testament to Cherryh's belief in Lamarckian evolution, or perhaps in the power of environment over heredity.

Today, the Kontrin rule the Reach. The Betas provide them with wealth derived from commerce and industry, and with azi slaves, genetically programmed to die at forty and tape-programmed to meet the needs of a single occupation. The Hives use azi slaves, too, and their relationship to the Kontrin is changing. They aid in a Kontrin feud that wipes out the heroine's extended family and sets her loose to roam, eventually to find a revenge that shatters the Reach culture and leads, perhaps, to a healthier rebirth.

Cherryh's human culture here is strange enough, but her Hive aliens strike me as a considerable success. The has taken features of ant and bee and combined them—elements of the Hives include Warrior, Worker, Drone, and Mother (*not* Queen); communication is by speech and taste/odor, with just a smidgen of the telepathy other writers have relied upon for a mind-unifying mechanism. Individuals have a measure of independence in thought and action, but exist only in the context of the Hive. They are *not* cells in a super-organism's body, nor sharers of a single mind. Cherryh has successfully avoided almost all the mystic pseudoscience claptrap inspired in her predecessors by Earth's social insects. She has achieved a Hive intelligence that makes sense. I congratulate her, and I look forward to her attempt to top it.

I had kind words for Allen Wold's first novel, *The Planet Masters*, calling him a writer to watch. Our second glimpse is **Star God**, a not entirely original treatment of the question of post-sapient evolution. The Seven Worlds are suffering from visions induced by a Visitor, ten parsecs in diameter, whose body seems to be a cloud of "coherent" neutrinos. The visions amount to a view of the local sector of the cosmos from the Visitor's viewpoint and carry all the certainty of actual perception. People interpret them as shared madness, shared perception, or divine revelation, and their certainties lead them to compulsive argument, to the point that society is collapsing—people are too busy yammering to tend to business. The United Council of the Churches of the Seven Worlds therefore sends Free Lance Agent Satinas off to investigate. (Note the Agent's name; it is part of a risen-angel joke.) He seeks the answer with the molluscoid Yakatskoi, the crystalline Lorthae, and the radiant Dirga. The last two represent possible

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ends to sapient evolution. Each of the three gives Satinas a gift, and he suffers changes that lead him to a confrontation with divinity. What is a god? Wold's answer seems to be that perfection of body, mind, and soul (conscience, wisdom, or compassion) defines at least a demigod. To go further, you need omnipresence.

St. Martin's trumpets *Star God* as "Wold's latest bid for the status of SF genius." That's hype, of course, but it does presumably reflect some high opinion. If so, Wold doesn't quite make it. He remains a man to watch, for he shows considerable originality in spots. He can slip important points across without belaboring them, though he does seem to feel obliged to set up the preliminaries a bit ham-handedly. He writes well, too, but not well enough to make his treatments of essentially traditional ideas prizeworthy.

John Varley's **Wizard** is a sequel to *Titan*. Like most sequels, it is weaker than the original. In this case, however, it is not too weak to stand alone. We no longer have the wonder of the world-beast Gaea's discovery, but we do have a tale of coexistence, in which Gaea has tried to make herself essential to Earth's swarms of Homo sap by offering miracle cures for the incurably ill—at a price. The price is that each patient must prove himself or herself a hero by killing a monster, rescuing a maiden, circumnavigating Gaea, or the like. Varley puts Chris, who suffers from periodic loss of contact with reality (sic), and Robin, an epileptic from a colony of parthenogenetic femlibbers, into this situation. They choose to seek their hero's badges by accompanying Cirocco Jones (the Wizard of Gaea and the heroine of *Titan*) and her sidekick Gaby on a tour of Gaea's peripheral brains to, as it turns out, foment an insurrection. Gaea is mad, you see, as anyone 3,000,000 years old might well be, and the Wizard wants to replace her capricious power with something a little more amenable to reason.

That is quite a premise. It's dramatic, original, and full of potential. If Allen Wold could match it, he'd really be on his way to the status St. Martin's wants to hand him, a status Varley earned with *Titan* and Gaea's creation. But *Wizard* doesn't stop with this. It has touches of wit and wonder that play an essential role in the story. For one, the centauroid Titanides have two sets of functional genitals, horse and human, have three parents each, and can mate in 29 combinations of one, two, three, or four; humans can even get into the act, and one human (the Wizard) *must*, in order to make each egg fertile, one of Gaea's mad little pranks. Chris gets involved with a Titanide lover, offering Varley a chance for a surprisingly erotic scene, and giving the story much of its emotional depth. There are more such touches, too, enough of them so that the occasional slips don't matter too greatly. When the revolutionaries meet the sand wraiths, invisible creatures that can be driven off by a few drops of water, the reader doesn't balk at the fact that these things live by eating *wet* meat. When Varley puts the femlib colony in the L2 libration spot, beyond the moon, the reader hesitates only briefly over the thought that L2 is not stable—perturbations of the orbit don't damp out there, as they do in L4 and L5; they increase (or did Varley put it there with malice aforethought?).

The story moves right along, with action, feeling, and thought aplenty. But beyond all this, all the excitement and pleasure of the story itself, there is a serious question: What is heroism?

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Varley seems to be saying that it is simply survival, though not the survival of the hermit. A hero is one who confronts life, goes to meet it and embrace it, and survives both its best and its worst. By that token, the jackass who gets his head shot off charging a machine-gun nest in his skivvies is no hero. I won't argue.

You don't care for philosophy? Don't sweat it. *Wizard* is a darned good yarn, and it's well worth the money on that level alone. And actually, if all it had going for it was that simple-minded tag about heroism, it wouldn't be worth a dime. Would it? If books are sugar-coated pills, people buy them for the sugar, not the medicine, don't they? And they like best those with little enough medicine, or large enough gobs of sugar, not to leave a bitter aftertaste.

Terry Carr's **Universe 10** is out now, probably in paperback by the time you read this. And it's the sort of assortment that justifies the whole idea of original anthologies. Carr has done a truly marvelous job this time around, with at least two stories that are worth the price of the book by themselves. Lee Killough's "Bête et Noir" is a moving tale of theatrical revenge, depending on the idea of *théâtre vérité*, in which the actors don their roles in an almost literal sense and can hence be manipulated in ways that must deserve B. F. Skinner's admiration. Howard Waldrop's "The Ugly Chickens," though it may appeal especially to a biologist like myself, strikes me as an intriguing, amusing, and highly original treatment of extinction and the dodo.

Among the other stories, all of which are better than mediocre, are Michael Bishop's "Saving Face," a tale of what might happen if public figures' faces could be copyrighted; James Tiptree, Jr.'s "A Source of Innocent Merriment," in which a world in the throes of birthing its life anticipates that life's history; F. M. Busby's "First Person Plural," in which a man's consciousness splits to animate a woman catatonic from birth—and they share that consciousness for a time, with consequences that must appeal to anyone with a sense of prurience; and more, including a couple of non-fact articles. Don't miss.

Dick Lupoff has found one more addition to the long list of excuses for reprint anthologies. In **What If? Vol. 1**, he has begun the task of assembling, for all the years for which the Hugo was awarded, those stories which didn't win but, he thinks, should have. The excuse has great potential—every anthologist can use it, and every one of them can produce a *different* series of anthologies, the choices being so very much a matter of opinion. (And how about a non-Nebula anthology?) I can't argue with Lupoff's choices here, for the years 1952–1958, but then I doubt I'd be able to argue with anyone else's either. Suffice it to say that he has assembled Tenn's "Firewater!," Knight's "Four in One," Sturgeon's "The Golden Helix," Shirley Jackson's "One Ordinary Day, with Peanuts," Anderson's "The Man who Came Early," Wilhelm's "The Mile-Long Spaceship," and Kornbluth's "Two Dooms," together with commentary on Hugic history. The stories are all good, holding up very well through the years, but I have seen most of them in other recent anthologies. And while the historical commentary adds a fair amount to Don Franson's and Howard DeVore's *A History of the Hugo, Nebula, and International Fantasy Awards* (Misfit Press, 1978; $4.00 from DeVore, 4705 Weddel, Dearborn, MI, 48125), it may add

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more than most people care to know.

G. Harry Stine's **The Space Enterprise** is a sequel of sorts to his *The Third Industrial Revolution*. It breathlessly and shamelessly continues the High Frontier proselytizing to say what we can do in space—communications, power, industry, and all the rest—and why we must do it. It is convincing enough—there is wealth to be had out there, given the humongous initial investments, and there are benefits of clean air and social equity to be gained down here—but it is wasted on the Analog audience. We know the arguments. We don't need the propaganda. But we know folks who do, don't we? Our representatives and senators, for instance. We might all benefit if they would read this book, absorb the information so painlessly presented in Stine's scenarios and arguments, and vote to strengthen our anemic space program. So buy a copy—and give it away.

Speaking of Analog, do you remember Roger Arnold's and Don Kingsbury's proposal for an energy-saving orbital spaceport? It appeared here in November and December of 1979, and just last Sunday I met Don and talked with him for awhile. He told me that he and Arnold, who works for Boeing, came up with the idea at a convention (sci, not sci-fi), and that Arnold got a promotion to the think-tank level out of the article. Does his new position mean that Boeing is going to be working on the spaceport idea? Is there now a chance that we may actually *see* that spaceport in our sky? Is Easton going to turn the Reference Library into a gossip column?

Jack Williamson has assembled a preface by Carl Sagan, and introduction by himself, and articles by LeGuin, Asimov, Leon Stover, Robin Wilson, Tom Clareson, the Panshins, Barry Longyear, Mark Hillegas, our Beloved Olander, Wilhelm, McIntyre, Gunn, and Neil Barron, plus a handful of people you've never heard of but he has, into **Teaching Science Fiction: Education for Tomorrow.** Why? The best answer may lie in Carolyn Wendell's contribution:

> "And it is when discussion runs over the time allotted for the class that I feel especially happy about being the 'sci-fi' lady . . . because I know that my students are with me, that they're thinking, responding, and learning. They are learning about literature and they are learning about human responsibility to the life that exists on 'this island Earth.' This is what should happen in a classroom." (p. 108)

The book is divided into three parts, on the topic, the teachers, and the tools. Stan Schmidt's piece, in Part II, concerns SF and the science teacher; he has taught SF at Ohio's Heidelberg College, and Ben Bova's observation of the course apparently led to Stan's present position. Pat Warrick, author of *The Cybernetic Imagination in SF*, reviewed three columns ago, talks about SF in a computers-and-society course. Other offerings mention using SF to teach science, psychology, religion, philosophy, and nearly every other subject.

So—if you teach SF or wish to use it in your teaching, this is the book for you. Its contributors discuss problems and successes in elementary school, high school, and college. They offer syllabi, reading lists, and annotated bibliographies. Altogether, they make SF seem both worth teaching and worth using as a teaching tool. I intend to keep the book on hand, for though I don't teach SF myself, I may one day. ■

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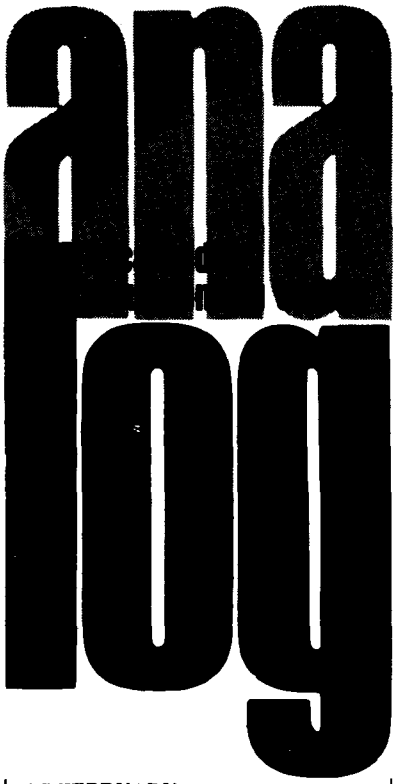

6-7 FEBRUARY
OMNICON II at Oceanside Holiday Inn, Fort Lauderdale, Fla. Emcee—Terrance Dicks. Registration Gold ticket (all events)—$25 in advance, 2-day ticket (Sat/Sun) $12.50 until 31 October 1980, $15 thereafter. Info: Millmeyer Productions, Inc., P.O.Box 970308, Miami FL 33197.

13-15 FEBRUARY
BOSKONE XVIII (New England Regional SF Conference) at the Sheraton Boston, Boston, Mass. Guest of Honor—Tanith Lee. Presentation of the Skylark Award. Registration—$12 until 1 January 1981, $15 at the door. No mail registration after 1 January 1981. Info: Boskone 18, NESFA, PO Box G, MIT Branch PO, Cambridge MA 02139.

12-15 FEBRUARY
AQUACON (southern California regional SF conference) at Disneyland Hotel, Anaheim, Calif. Guest of Honor—Philip Jose Farmer, Fan Guest of Honor—Janice Bogstad and Jeanne Gomoll. Registration—$??. Info: Aquacon, P.O.Box 815, Brea CA 92621.

23-26 FEBRUARY
COMPCON Spring 81 at San Francisco, Calif. Theme: VLSI—in the laboratory, the office, the factory, the home. Info: COMPCON Spring 81, P.O.Box 639, Silver Spring MD 20901.

2-7 SEPTEMBER 1981
DEVENTION II (39th World Science Fiction Convention) at Denver Hilton, Denver, Colorado. Guests of Honor—C. L. Moore and Clifford Simak, Fan Guest of Honor—Rusty Hevelin, Toastmaster—Edward Bryant. Registration until 1 September 1980, $25 attending, $15 supporting. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Denvention II, P.O.Box 11545, Denver CO 80211. 303-433-9774.

—ANTHONY LEWIS

*Items for the Calendar should be sent to the Editorial Offices, **four months** in advance of the issue in which you want the item to appear.*

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BRASS TACKS

Dear Stan,

Every couple of years, someone comes up with a story involving lighter-than-air vehicles being navigated through the atmosphere of a planet such as Venus or Jupiter. All too often—once being too often—these stories include description of "tacking" as a means to progress against the wind. Now, a boat sailing through water can make progress against the wind because it has a rudder with which to lever a sideways force from the water; and a solar sail craft could tack across the solar system by judiciously adjusting the balance of gravity pulling towards the sun and the light pressure blowing outwards. But a free-floating vehicle wholly contained in the atmosphere of a planet *cannot* move against the wind without a motor driving it. Tack as much as you like, but you'll move one way only, with the wind. And, by the way, since a lighter-than-air unpowered vehicle floats precisely with the wind, no one on board will feel wind blowing past.

So—can we shoot this hoary old story down once and for all?

JOHN GRIBBIN

We'll try.

Dear Mr. Schmidt:

Over the years I have enjoyed Analog and I expect that enjoyment to continue in the future. I particularly appreciate the feeling of optimism that pervades Analog and, in fact, much of science fiction. People are shown solving their problems. In most cases solutions involve the use of logic and intelligence. This tends to distinguish science fiction from what Spider Robinson in the August book review column refers to as "anti-science fiction." Yet in that same August issue we have the conclusion of a story that appears to me to be a simple horror story. I refer to "Anasazi" by Dean Ing.

There have been SF horror stories before, of course. Probably the one best known to SF fans is John Campbell's "Who Goes There?" Certainly the monster (monsters?) in that story is as frightening as any concocted since. The monster was not too difficult to kill but very difficult to identify. It took over people's bodies and looked and acted just like them. Campbell's heroes found a way to make the monster identify itself.

Some years ago James Schmitz wrote a series of SF monster stories. Again, the monsters were simply part of the problem facing the protagonists, who in each case found solutions. In essence, they were no different from any other well-written adventure stories. In the pre-Telzey stories, at least, abilities and events were not added "as needed" and without warning. There were no

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surprise cavalry bugles in the distance.

"Anasazi" sounds like a rewrite of "Who Goes There?" with a bit of "Alien" and "War of the Worlds" thrown in. The heroes even find a way to identify the monsters. In some ways the method holds up better than Campbell's. The main difference is that, where Campbell's method works, *Ing's doesn't*. The heroes *twice* think the monsters have been destroyed and each time are wrong!

Logic and heroism are not enough in "Anasazi." Everyone feels safe at the end, but the monsters are still alive. The author essentially kills them off himself, with the expedient of the sun and ants. The trick is really the same as in "War of the Worlds," but here serves as an anticlimax rather than a surprise twist. The message, if there is one, seems to be "I can create a scary monster and I can kill it off. Human characters are not important." This message of human helplessness is quite typical of horror movies, but seems rather weak in SF.

I hope in the future Analog editors will again insist that story characters solve their own problems. Someday the ants may not come through for us.

Yours truly,

DONALD A. VARVEL

I certainly wouldn't call "Anasazi" a simple horror story; if that's all you saw, I'd say you missed some things. In general, I will tend to insist that our story characters make determined and competent efforts *to solve their problems—which these did—and I expect them to succeed a good deal of the time. But I won't insist that they* always *succeed. The universe doesn't work that way, either.*

The Editor, Analog:

Milton Rothman's comment on air conditioning (August 1980) has been underscored by the vital statistics from Texas recently, with a couple of factors added. One, many of the dead were on pensions or other low incomes and in most cases either did not have air conditioning or feared their electric bills would be too high to pay. Two, many would not take advantage of the cities which had opened air conditioned centers to them, because they were afraid their homes would be looted while they were away. A further note on that very real fear is that many of them had their doors and windows nailed or boarded shut to keep out the enterprising junkies and other liberators of people's goods. Sealed like this, their homes became death traps. So a number of factors added to his comment.

His valid views on smoking can be backed by anyone who has ever done much firefighting or rescue work. I have spent a lot of busy hours dousing the smoking ruins of homes lit off by a moment's carelessness with a butt. I would like to add that smokers need not quit to avoid lung cancer. All they have to do is smoke in bed and they'll never have it. . . .

Wallace West would have been tickled at a note in "National Defense" magazine. One reader had worked on tank motive power during World War II and had run into troubles on the odd assortment of aircraft engines and groups of truck engines coupled to the drive, among other things. He worked up a presentation on steam-powered tanks and his one-star boss, who worked for a Detroit firm in peacetime, offered him a chance to shut up or serve in some distant place with a bad climate and unpronounceable name. Maybe if he'd been allowed to work on it, the XM-1 tank would be a steamer . . . Sad to hear West won't be heard from any

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more. I saw little of his work, but it was always good.

JOHN P. CONLON
Worn-out firefighter

Dear Mr. Schmidt:

I recently had an interesting experience. I fell behind in my reading and took on two issues of Analog back to back (the July and August issues). I read your editorial on energy in the July issue and was again impressed by your incisiveness. After finishing the excellent novelette "Federation World," I read your second editorial on the draft. Again I was impressed by your trenchant treatment of the issue.

I am writing not to speak to the issues raised in your editorials (for the record, I agree with your position on energy and disagree on your conclusions about the draft), but to compliment you on the way in which you treat those issues. Your purpose is to stimulate thought and you succeed. I am inundated with the printed word trying to convince me to think a certain way; it is stimulating and refreshing to think, period. It is also refreshing to see an author keep to his point and not wander off onto the seductive byways of polemic. You are to be doubly complimented for not doing so, as you obviously feel strongly about the issues you raise.

Congratulations on a job well done.

HUGH T. THOMSON

And it's also refreshing to hear from a reader who recognizes *what my real purpose is. Thank you!*

Mr. Schmidt:

I have a few comments to make concerning "Twilight Song" by Jerry Pournelle (June 1980).

Firstly, I agree that MAD is an inappropriate means for dealing with threats short of nuclear attack. It is not; nor does the military pretend that it is designed for anything else. It is, in fact, the modern version of the "area bombardment" theory of *total* warfare which came into use during World War II. *Limited* warfare still is conventional.

I disagree with Mr. Pournelle mainly in his statement that we have neither a sophisticated nor a large army. Perhaps we need a larger army; that depends solely upon unforeseen circumstances (who we fight, with what allies, where, etc.). As for sophistication, we currently have helicopters which can detect and destroy ground troops while remaining out of detection range. The Phantom jet is faster and more maneuverable than any other operational aircraft in the world. The M-60 tank is claimed to be the best in the world. There are other examples. They are not operated by "average recruits."

The average recruit needs no more know-how to operate his equipment than you need to operate your television set. He is not expected to repair it any more than a knight was expected to repair his own armor.

There are so many flaws in Pournelle's logic that I am at a loss for space. To pick one: it was not because the Roman army became a volunteer organization that it became dangerous to Rome; it was because that army eventually consisted of non-Romans (Greeks, Britons, etc.). There is little danger that the U.S army will become predominantly Canadian.

Heinlein *is* right about a society forced to depend on conscripts not being worth defending; and if we cannot find enough volunteers for military service, it is because service now means dying for a Vietnamese dictator (or for whales). It apparently no longer has anything to do with defending our country.

G. R. PATTERSON III

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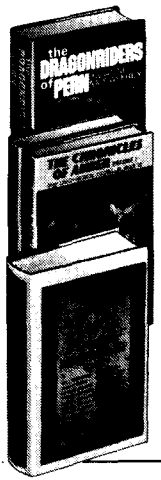

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